States Department of the Interior
of Land Management

Draft

Great Falls Resource Area
Lewistown District Office

January 1993

ROYAL EAST JOINT VENTURE EXPLORATION PROJECT SWEET GRASS HILLS Environmental Impact Statement

The Bureau of Land Management is responsible for the stewardship of our public lands. It is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times. Management is based on the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology. These resources include recreation; rangelands; timber; minerals; watershed; fish and wildlife; wilderness; air; and scenic, scientific, and cultural values.

BLM-MT-ES-93-005-4191

Cover photo courtesy of Montana Historical Society

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Lewistown District Office
Airport Road
P.O. Box 1160
Lewistown, Montana 59457-1160

TAKE PRIDE IN AMERICA

IN REPLY REFER TO

Dear Reader:

This draft environmental impact statement (DEIS) on the Royal East Joint Venture exploration project is for your review and comment. It assesses the impacts of the exploration project in the Sweet Grass Hills, Liberty County, Montana. The DEIS was developed as an interagency effort under the lead of the United States Department of Interior, Bureau of Land Management with the Montana Department of State Lands as a cooperating agency.

We welcome your comments on this DEIS. Those comments addressing the adequacy of the impact analysis or the scope of this DEIS will be responded to in the final EIS. Specific comments are the most useful; these include suggestions for alternative data sources or impact analysis methodologies. All comments will be considered in the decision making process.

We would appreciate your comments on the DEIS by April 27, 1993. Questions or comments should be directed to David L. Mari, District Manager, Bureau of Land Management, Airport Road, P.O. Box 1160, Lewistown, MT 59457-1160, Phone: (406) 538-7461. These public meetings have been scheduled to allow individuals the opportunity to comment on the DEIS:

Date	City	Time	Location
March 16, 1993	Chester, MT	7:00 p.m.	Chester High School
March 17, 1993	Browning, MT	6:00 p.m.	Blackfeet Tribal Conference Room
March 18, 1993	Rocky Boy, MT	3:30 p.m.	Stone Child College

Please keep this copy of the DEIS, as an abbreviated final EIS may be issued in accordance with the Council on Environmental Quality (CEQ) regulations. A copy of the final EIS will be sent to those on the DEIS mailing list and anyone requesting a copy.

Sincerely,

David L. Mari

David L. Mari
District Manager

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

ROYAL EAST JOINT VENTURE EXPLORATION PROJECT

SWEET GRASS HILLS, LIBERTY COUNTY, MONTANA

January 1993

Prepared by: U.S. Department of the Interior
Bureau of Land Management
Lewistown District
Great Falls Resource Area
Lewistown, Montana 59457

in cooperation with

Montana Department of State Lands
Hard Rock Bureau
Capitol Station
Helena, Montana 59620

Applicant: Manhattan Minerals (US) Ltd.
401-409 Granville Street
Vancouver, B.C. V6C 1T2
Canada

and

Lehmann & Assoc. of Montana, Inc.
54 N. Last Chance Gulch, Suite 6
Helena, Montana 59601

United States Department of the Interior
Bureau of Land Management
Lewistown District Office
Lewistown, Montana

DRAFT
Royal East Joint Venture Exploration Project
Sweet Grass Hills, Liberty County, Montana
Environmental Impact Statement

ABSTRACT

This draft environmental impact statement (EIS) discusses a proposal by Manhattan Minerals (US) Ltd. to build approximately 28,000 feet of access road in the Tootsie Creek area on East Butte. Once constructed, the access road would serve as location for approximately 38 inroad drill sites, as well as for exploration trenches.

This draft EIS analyzes the environmental consequences of three management alternatives: the proposed action and preferred alternative, a modified proposed action, and a no action alternative.

SUMMARY

Manhattan Minerals (US) Ltd. is proposing to explore for gold and silver deposits by building approximately 28,000 feet of access road in the Tootsie Creek area on East Butte of the Sweet Grass Hills. Once constructed the access road would serve as location for approximately 38 in-road drill sites as well as for exploration trenches.

A record of decision and environmental assessment (EA) completed on July 7, 1992, identified potentially significant impacts to Native American traditional cultural, religious and historic resources. The record of decision found that potentially significant environmental impacts could result, and that preparation of this environmental impact statement (EIS) was necessary.

The EIS analyzes the proposed action (preferred alternative), a modified action alternative, the no action alternative and discusses a helicopter alternative. Agency mitigating measures have been included by Manhattan Minerals into their proposed action. The disturbance associated with each alternative is shown in Table 3.

East Butte is one of the three main buttes that make up the Sweet Grass Hills. These buttes rise several thousand feet from the plains of northcentral Montana. The "Hills" contain unique assemblages of plant and animal life for the region. The area attracts considerable interest for its recreational opportunities, wildlife habitat, traditional and historical Native American use, mineral potential and importance as a groundwater recharge area. The Sweet Grass Hills were designated an area of critical environmental concern (ACEC) in the West HiLine Resource Management Plan (BLM, 1992).

Native American groups were consulted to collect information, identify their concerns and to locate any specific traditional cultural sites that might be affected. No specific sites were identified by Native American individuals or groups that would be physically impacted by the proposal, but Devil's Chimney Cave, in the project area, is of special significance to Native Americans. A public scoping meeting was held in Chester on April 28, 1992, to hear public concerns about the project. The major resource concerns raised during the meeting and subsequent public comment period include water quality, Native American religious use, wildlife (specifically elk) and recreational values.

Mitigating measures have been developed and incorporated into the proposed action to address these resource concerns. To protect groundwater quality a drill hole plugging program has been included in the Reclamation Plan. A seasonal restriction has been developed to protect important elk winter range and calving ground. Recreational values are linked to hiking and hunting activities. These will be protected by restricting motorized vehicle access, by avoidance of the cave, and by reclamation that would reduce visual impacts.

The residual impacts that would remain after applying all mitigating measures are shown in Table 4. Most of the impacts are minor. Locally moderate level impacts would occur to recreational and visual resources under the preferred alternative. Impacts to Native American cultural, religious practices and historic values are potentially significant for certain groups or individuals that utilize the area. This is due to impacts to the natural setting around Devil's Chimney Cave.

CONTENTS

CHAPTER 1
PURPOSE AND NEED FOR PROPOSED ACTION

INTRODUCTION

Manhattan Minerals (US) Limited (Manhattan) has submitted to the Lewistown District Office, Bureau of Land Management (BLM) and the Montana Department of State Lands (DSL) a proposal to perform hardrock mineral exploration work on East Butte, in the Sweet Grass Hills, Liberty County, Montana (Figure 1). The main exploration area is located in the Tootsie Creek drainage basin of East Butte, in portions of sections 19, 20, and 30, T.36N., R.5E.

The purpose of the exploration proposal is to collect geologic information to assess the mineral potential of patented and unpatented mining claims, in accordance with rights held under the 1872 Mining Law, as amended.

Consideration of this exploration proposal is in conformance with the West HiLine Resource Management Plan and Environmental Impact Statement (RMP/EIS). The record of decision for the RMP/EIS (BLM, 1992) designated the Sweet Grass Hills an area of critical environmental concern (ACEC); directed the area be left open to mineral entry; and included the following general guidelines for hardrock mineral activities to protect the ACEC values:

1. Native Americans who use the area will be consulted prior to surface disturbing activities which require BLM authorization. This consultation will provide guidance for application of restrictions or mitigating measures where negative effects to traditional cultural values may exist or occur.

2. An approved Plan of Operations will be required for all activities exceeding casual use. "Operations" includes all activity associated with exploration, assessment work, development and processing of mineral deposits located under the mining laws.

3. Timing restrictions may be applied on an individual basis to prevent unnecessary or undue degradation to accommodate mineral operations while protecting important wildlife habitat.

4. Rehabilitation measures will consider the replacement of disturbed elk and mule deer habitat.

5. Mineral operations located in crucial wildlife habitat may be required to rehabilitate previous disturbances prior to initiating new surface disturbing activities to keep disturbed acreage to a minimum. This will provide for continued mineral operations while rehabilitating important wildlife habitat at the earliest possible opportunity.

6. To ensure adequate rehabilitation, bonding will be required for all operations, except casual use.

BACKGROUND

On June 30, 1986, the BLM and DSL authorized Santa Fe Pacific Mining (SFPM) to construct approximately 14,000 feet of access road and six in-road drill sites on East Butte.

On July 2, 1986, the Blackfeet Tribe filed an appeal of the June 30 approval action with the Interior Board of Land Appeals (IBLA). Filing the appeal did not stay the approval decision (43 CFR 3809.4f) and work on the project began that July.

On April 28, 1987, SFPM submitted to BLM and DSL an amendment for construction of an additional 4,000 feet of road and four in-road drill sites on BLM land. Due to the appeal pending on the initial Plan approval, BLM decided, in a letter dated June 12, 1987, that it would not take any action until IBLA had ruled on the Blackfeet Tribe's appeal. This amendment proposal was eventually withdrawn by SFPM. However, the original June 30, 1986 approval for road construction and drilling was still in effect and work continued on the project through the summer of 1987.

During October 1987, SFPM drilled several small core holes just south of Tootsie Creek, near Mount Royal, using a small portable drill. Sample recovery proved difficult and the operator determined that full-sized drilling equipment would be needed to explore the area.

In April 1988, SFPM indicated they were no longer interested in pursuing the project, but that their partner, the underlying claim holder, E.K. Lehmann and Associates of Montana, Inc. (Lehmann) would continue exploration activities.

On July 26, 1988, IBLA ruled on the Blackfeet Tribe appeal. The board's decision (103 IBLA 228) affirmed BLM acted properly in approving the Plan of Operations and returned the case to BLM jurisdiction.

In August 1988, Lehmann entered into a joint venture with Cominco American Resources, Incorporated, of Spokane,

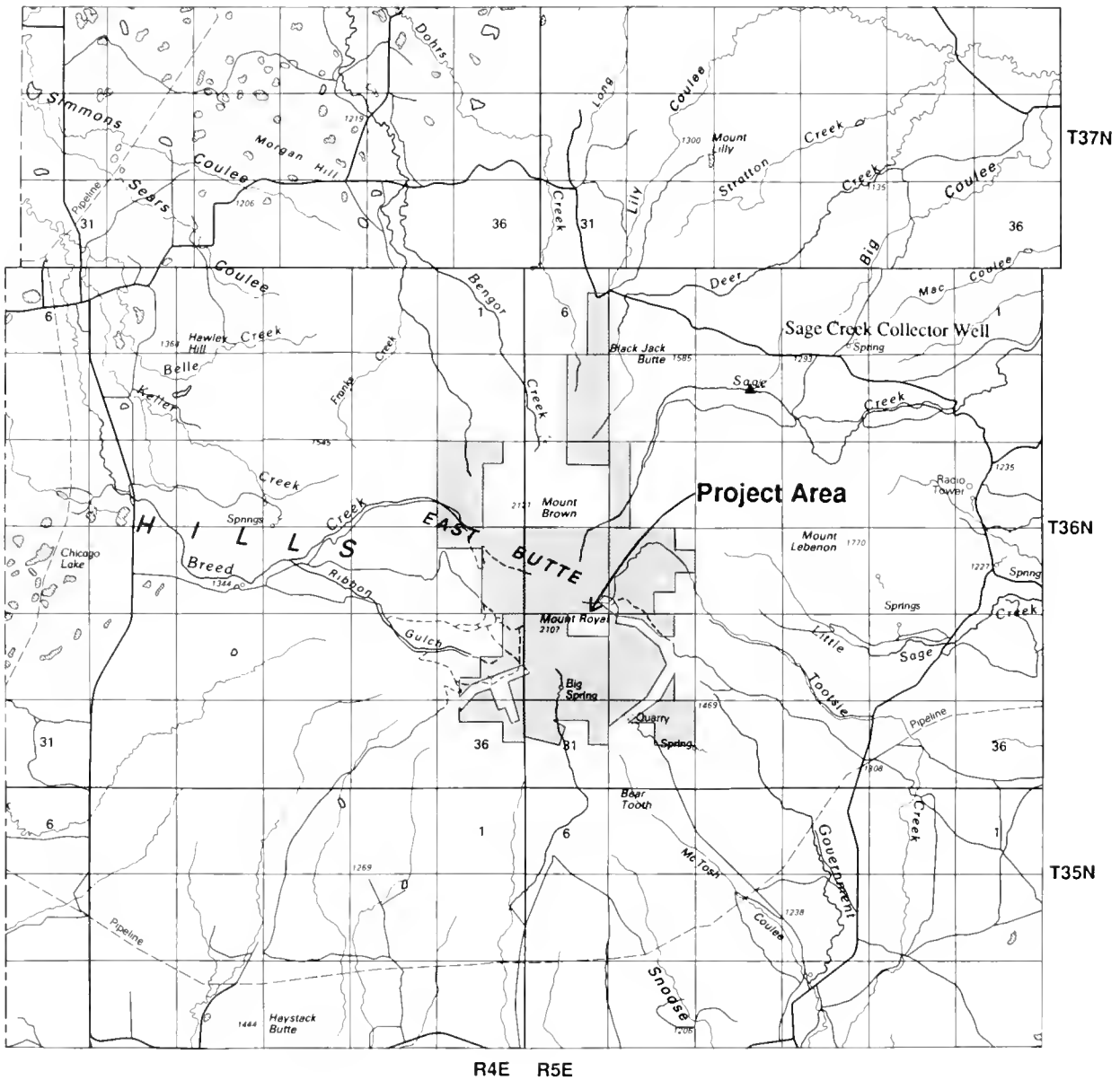

Figure 1 – General Project Area

BLM Surface

▲ Sage Creek Collector Well

Washington, to explore the property. During the remainder of 1988, Cominco conducted mapping, sampling and surveying of the area in an effort to locate potential drilling targets.

In 1989, Cominco received approval from BLM and DSL to construct 2,600 feet of access road and drill at nine in-road drill sites. This approval was appealed by the Original Chippewa Cree to IBLA along with a request for a stay of the action.

IBLA denied the stay request and Cominco eventually constructed 2,000 feet of access road and drilled at only three of the proposed locations during 1989.

During 1990, SFPM and Cominco recontoured and reseeded all areas disturbed by exploration activities. Partial release of the reclamation bond was granted, with the remainder being held pending reclamation success.

IBLA dismissed the Chippewa Cree appeal as moot on January 23, 1992. This was because the project had already been constructed and reclaimed.

On February 25, 1992, BLM and DSL received a proposal from Manhattan Minerals to conduct exploration activity in the same general area as SFPM and Cominco.

On July 7, 1992, BLM issued a record of decision on the Manhattan proposal based on the results of an environmental assessment (EA). The decision was to withhold approval of the Manhattan Plan of Operations until completion of an EIS due to the potential for significant impacts to Native American traditional cultural, religious and historical resources.

SCOPE OF ANALYSIS

This EIS is prepared by the Bureau of Land Management, Lewistown District, Great Falls Resource Area; in cooperation with the Montana Department of State Lands. Additional input has been provided by the Montana Department of Health and Environmental Sciences, Water Quality Bureau; and the State Historic Preservation Office. The analysis considers the impacts of the proposed action, and of other area activities, on both the private and federal land and resources.

Particular emphasis is placed on analysis of potential impacts to Native American traditional cultural, religious and historic resources; and development of measures to reduce impacts of the exploration proposal on these resources.

The proposed action and alternatives are analyzed to determine whether they would cause unnecessary or undue degradation, and provide for reasonable reclamation of the land and resources in accordance with regulatory approval/permitting requirements of 43 CFR 3809 and the Montana Metal Mine Reclamation Act (Title 82, Chapter 4, Part 3, MCA).

The analysis includes cumulative impacts of the entire exploration project. Mine development and operation is not proposed or reasonably foreseeable and is not analyzed in this document. If the exploration results indicate mineralization present in economic quantities, there would need to be a much greater amount of additional exploration and development drilling before the minability of any deposit could be determined (see Reasonably Foreseeable Activity & Impacts section). Factors such as deposit size, configuration, grade, mineralogy and precise location need to be established before being able to determine economic viability and hypothesize the type of mining and processing methods that would likely be used. Until such factors can be determined, any environmental analysis of mine development would be so speculative as to provide no useful information for impact assessment or mitigation.

Future mine development proposals submitted by Manhattan, or any other operator, would require additional evaluation using the environmental analysis process. No rights to mine would be conferred by approval of the exploration proposal or alternatives.

AGENCY RESPONSIBILITIES

1. The Bureau of Land Management is responsible for preventing unnecessary or undue degradation of federal lands from exploration and development activities authorized by the Mining Law of 1872. Federal regulations 43 CFR 3809 detail the requirements for approving a Plan of Operations. During the approval process, BLM must conduct an environmental assessment (43 CFR 3809.2-1) to analyze impacts and develop mitigating measures needed to prevent unnecessary or undue degradation. Unnecessary or undue degradation is defined in 43 CFR 3809.0-5(k); and briefly means: surface disturbance greater than what would normally result when an activity is being performed by a prudent operator taking into consideration the effects of the operation on other resources, and includes initiation of reasonable mitigating measures and reclamation of the disturbed areas. If it is determined that the action will not cause unnecessary or undue degradation then BLM is required to approve the Plan of Operations. Activities on BLM-administered surface over private minerals are approved in a similar manner.

The approval of a Plan of Operations is a federal action subject to the National Environmental Policy Act (NEPA). NEPA requires the respective federal agency to analyze the impacts of their actions on the human environment through

preparation of environmental documents. This EIS serves as the environmental document required by NEPA.

Prior to approving a Plan of Operations, BLM must comply with Section 106 of the National Historic Preservation Act (NHPA), as amended. Section 106 of the NHPA does not prevent or prohibit the disturbance of historic properties by a federal action, but does require specific steps of the federal agency before approving such an action. These steps are implemented by regulations found at 36 CFR 800. In brief, compliance involves five basic steps: 1) Identifying historic properties which might be affected; 2) Assessing the effects to those properties; 3) Consultation with the State Historic Preservation Office and interested parties; 4) Comment by the Advisory Council on Historic Preservation if historic properties will be affected; and 5) Proceeding with the action or decision.

The American Indian Religious Freedom Act (AIRFA) was passed as a joint resolution of Congress and has no implementing regulations. The resolution states that it shall be the policy of the United States to protect and preserve for the American Indian, Eskimo, Aleut, and Native Hawaiian the inherent right of freedom to believe, express, and exercise their traditional religions, including but not limited to access to religious sites, use and possession of sacred objects, and freedom to worship through ceremonies and traditional rites. BLM complies with this authority by obtaining and considering the views of Native American leaders when a proposed land use might conflict with traditional Native American religious beliefs or practices.

2. The Montana Department of State Lands administers the Montana Metal Mine Reclamation Act (MMRA) and the Montana Environmental Policy Act (MEPA). The purpose of the MMRA is, first, to protect the usefulness, productivity and scenic values of the state's lands and waters and second, to reclaim mined properties to comparable stability and utility to that of adjacent areas. These Acts and subsequent regulations (ARM 26.4.101 et seq.) detail the procedure DSL must follow to issue or amend an Exploration License. The amount of bond needed to insure performance of reclamation requirements is calculated and held by DSL, with BLM concurrence. This EIS serves as the environmental document required by MEPA.

3. The Montana Department of Health and Environmental Sciences, Water Quality Bureau (WQB) administers the Montana Water Quality Act. WQB issues permits for discharge to both surface and ground waters. Discharge to surface water is not required in the proposal, and no groundwater discharge permit will be issued by WQB for this action. An exemption from the groundwater permit requirement is provided for activities permitted under the MMRA by DSL. A storm water discharge permit is required from WQB for construction activities disturbing more than 5 acres.

4. The State Historic Preservation Office (SHPO) was mandated by the National Historic Preservation Act of 1966. SHPOs are responsible for developing a comprehensive state preservation plan, conducting a continuing statewide survey of cultural properties, commenting on all National Register nominations, and commenting on documentation supplied by federal agencies for compliance with Section 106 of the National Historic Preservation Act. The SHPO conducts its Section 106 responsibilities according to federal regulations as contained at 36 CFR 800.

CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES

The following proposed action was submitted by Manhattan Minerals to the agencies. In response to a series of review questions or comments from BLM and DSL various mitigating measures were adopted into this proposal by the proponent. The proposed action is the agencies' preferred alternative.

PROPOSED ACTION (Preferred Alternative)

The proposed action submitted by Manhattan is a Plan of Operations to construct approximately 26,300 feet of access road/trench with 38 in-road drill sites in the Tootsie Creek area of East Butte, Sweet Grass Hills (Figures 2 & 3). This would occur on a mixture of private and federal surface. An additional 1,500 feet of road construction for access purposes is proposed at the head of the Breed Creek drainage. This road would join with existing access roads to provide the operator with access into the project area that avoided crossing certain private land. If access across private land can be secured, this road would not be constructed.

Dependent on weather conditions, activity would begin in mid to late June, and last approximately two years, or field seasons. Reclamation activities, including recontouring and reseeding, would be completed by the end of the third field season.

Road construction would occur along both previously constructed (and reclaimed) and undisturbed routes (Table 1). The exploration road surface's running-width would be about 12 feet, with a maximum disturbance of about 35 feet when including sidecast, cut slope, topsoil stockpile and slash pile. Construction would use a track mounted excavator to pioneer the road-way and salvage any existing topsoil on the upslope side of the excavation. All trees and brush would be placed at the toe of the sidecast to act as a slash filter windrow (sediment trap). At selected locations every few hundred feet, where bedrock is not encountered in the road building process, a trench would be excavated in the inside center of the road to expose bedrock. Trenches would be excavated using a cubic yard bucket approximately 30-inches wide. Maximum trench depth would be 20 feet, though most would not exceed 10 feet. The length of the trenches would depend on the extent of bedrock mineralization. Materials excavated from the trench would be placed on the adjacent road surface, or in the sidecast. As soon as geochemical sampling and mapping of the bedrock is complete (typically the same or next day), the trench would be back-filled and smoothed so the road is again accessible. Occasionally in rocky terrain, a small dozer (D4 size) would be used to grade the road after the trench is backfilled so it could be accessed by drilling equipment.

Figure 3 shows a tentative drill site pattern. More precise drilling sites would be selected, based on results of the road/trench mapping and sampling phase. The drill sites would be located directly in the road. At these sites overall disturbance width may total up to 45 feet. Drilling would take place using reverse circulation drilling equipment. Thirty-eight drill sites are planned. Individual drill hole depth would be approximately 500 feet. For the entire drilling project, approximately 57,000 gallons of water may

TABLE 1
PROPOSED DISTURBANCE BY OWNERSHIP

	US surf US min	US surf Priv min	Priv surf US min	Priv surf Priv min	Total
Existing Trail/New trench	1,800'(4)				1,800' (4)
Reopened Road Access Only	400'(0)				400' (0)
Previously Built Road/trench	8,050'(0)		550'(7)	2,200'(0)	10,800' (7)
NewRoad/trench	8,900'*(17)	2,050'(7)	3,500'(1)	350'(2)	14,800' (27)
TOTALS	19,150' (21)	2,050'(7)	4,050'(8)	2,550'(2)	27,800' (38)

Estimated number of drill sites shown in parentheses.

Source: Manhattan Proposed Exploration Plan, 1992.

* Includes possible 1500 feet in Breed Creek for access.

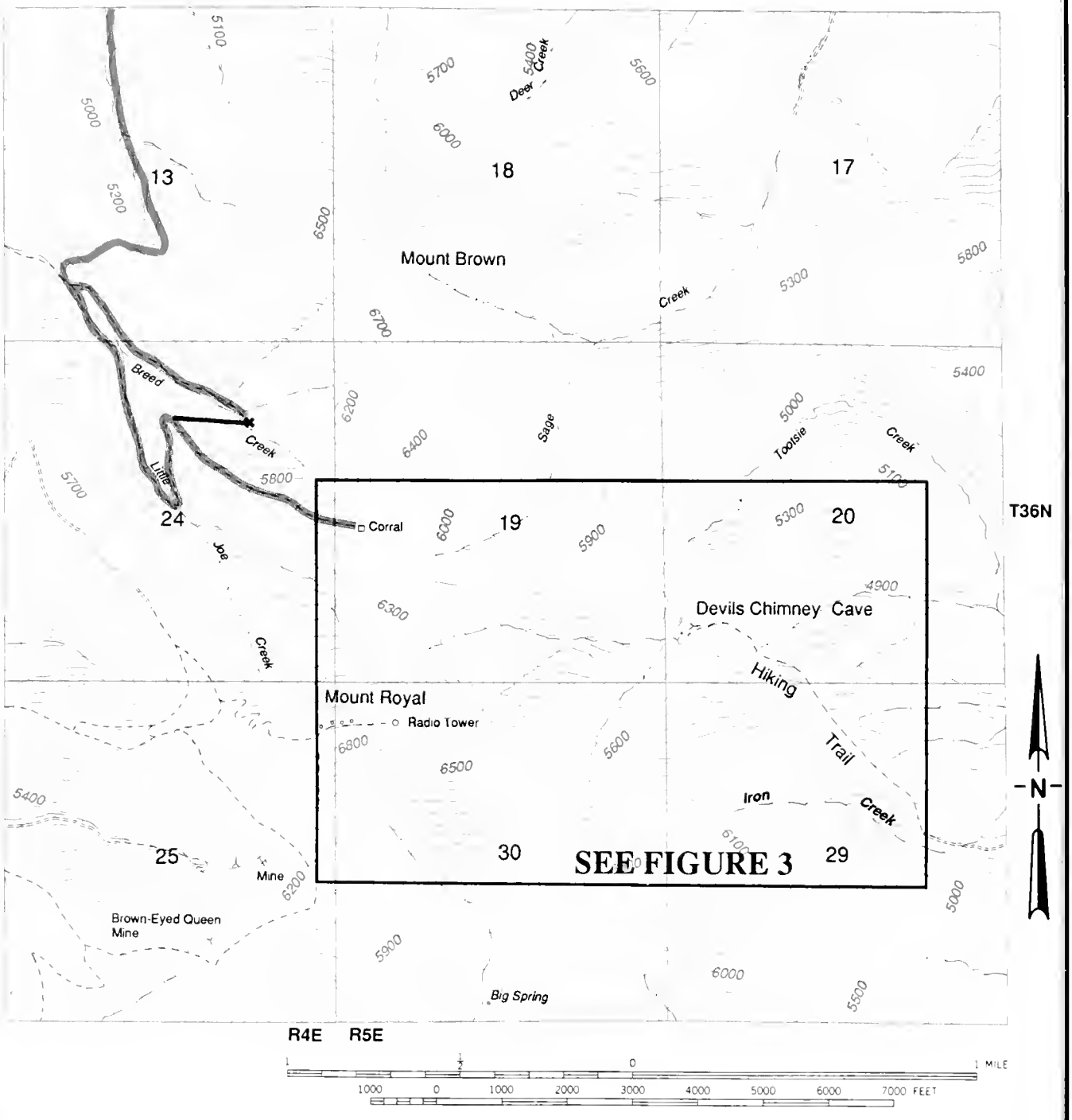

Figure 2 – Project Area Topography and Access

New Alt. Access Road Construction

Existing Access Road

Breed Creek Prospect

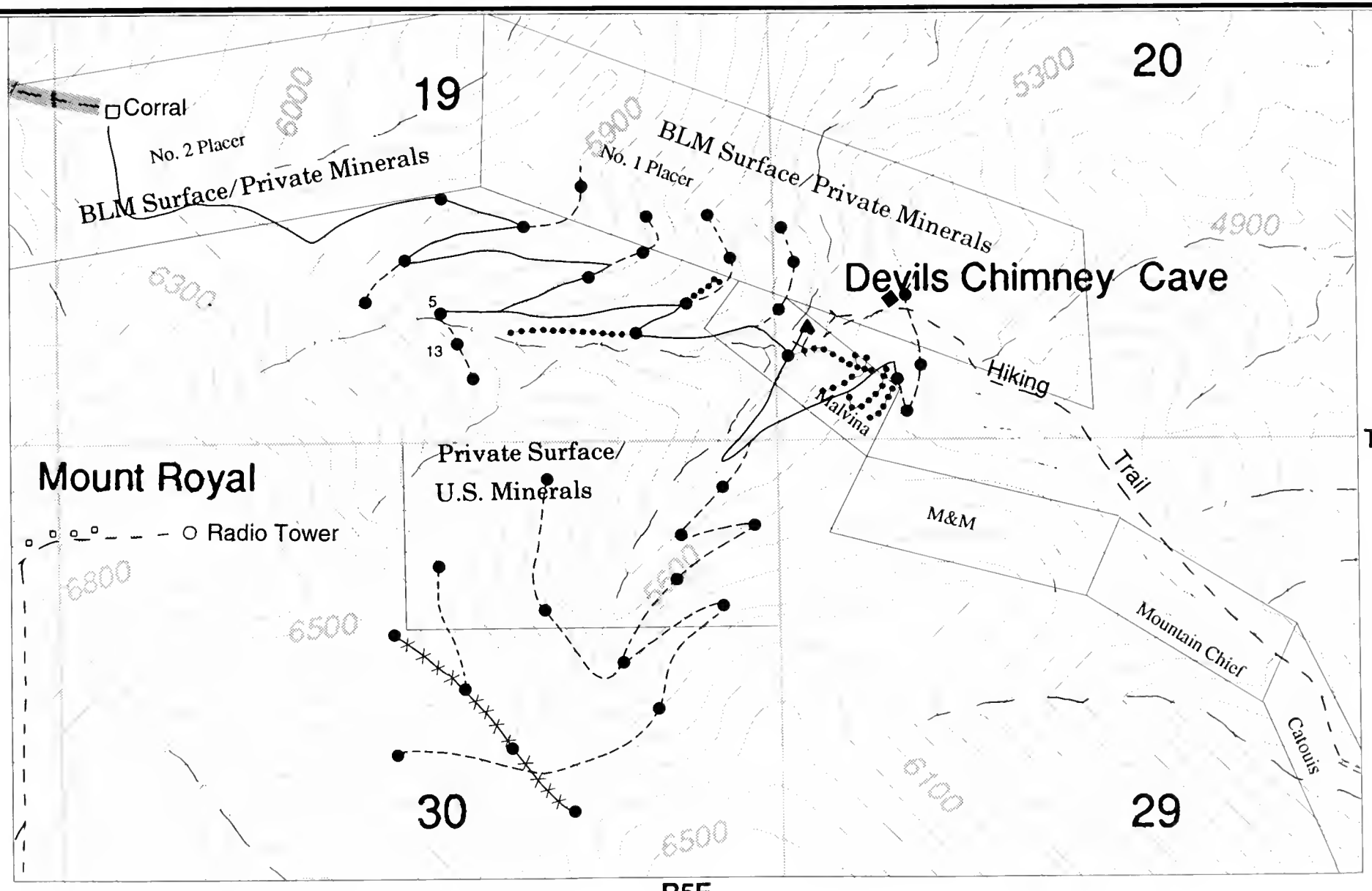

Figure 3 – Detailed Project Map

Scale 1" = approx. 1000 feet

- ..... Built and Reclaimed (would not be reopened)
- ——— Previously Permitted Road to be Reopened
- - - - - Proposed New Road / Trench
- ×××× Abandoned Trail / Proposed Trench
- ● Drillsite Locations (tentative)
- ▲ Campsite Location
- ◆ Devil's Chimney Cave

N

be needed as circulating medium for drilling if the drill holes do not encounter enough water to circulate the cuttings. This water would be obtained from Tootsie Creek by using hand tools to place a small canvas retention structure, creating a pool two to three feet deep. A pump would remove the water into a truck and transport it to the drill site.

Geologic samples collected from trenches or by drilling would be sent off-site for analysis at a commercial laboratory. Assay results would be the sole property of the operator/claimants.

During operations, a campsite would be maintained on private land near Tootsie Creek (Figure 3). The camp would be limited to accommodations for a maximum of four people. The camp site would include one wall tent, perhaps a second tent, fire pit, and any needed tables, chairs, etc. A temporary latrine would be dug in the woods east of drill site 18 and backfilled at the end of use or each field season. The camp would utilize propane powered cooking and lighting equipment; with no need for an electrical generator. All garbage and refuse would be hauled from the camp. The drill crew and excavator contractor would commute daily to the project as they would need to haul fuel and supplies.

Minor variations in activity within the scope of this proposal could include: placing of culverts; minor realignment of roads; additional drilling activities that do not require the construction of roads; changes in seed mixture or seeding rates; alternate drill hole plugging procedures; alternate equipment use; and temporary placement of small structures and routine maintenance. These actions do not require a formal Plan amendment, but may be treated as compliance matters to be mutually agreed upon by agency inspectors and the operator in the field. Minor revisions would not exceed the scope of the current environmental analysis.

Operating Practices

These operating practices have been incorporated into the proposed Plan of Operations to reduce exploration impacts. They are part of the proposed action:

(1) No mechanized surface disturbing activity would occur from December 1, through June 15, to avoid impacting critical elk winter range and calving grounds.

(2) No mechanized surface disturbing activity would occur within 200 feet of Devil's Chimney Cave.

(3) During road or trench construction, all trees 4 inches or greater DBH (diameter breast height) in the roadway would be cut instead of being pushed over with the dozer or excavator and left hanging; or rolled into sidecast.

(4) Reclamation of previously disturbed areas no longer needed for access or operations, would be performed concurrently with the ongoing activity to minimize disturbed acreage.

(5) Maximum sustained road grades would not exceed 8 percent, with a short pitch (300 feet maximum) not to exceed 12 percent. Roads would be outsloped whenever possible to minimize disturbance and prevent channeling. At drill sites roads would be insloped.

(6) No soil materials or sidecast would be spilled into stream drainages or their tributaries. Roads and trenches would be located at least 50 feet from Tootsie Creek and all intermittent creeks, except at approved crossings or stream traverses. Equipment and supply storage areas would be located at least 50 feet from Tootsie Creek.

(7) Water bars and culverts would be installed where determined necessary by BLM/DSL personnel.

(8) Prior to arriving onsite, excavating, drilling equipment and support vehicles would be washed to remove any accumulated soil material that may transport noxious weed seeds into the area. This would be done at a commercial truck or car wash. Any noxious weed infestations that occur would be controlled by the operator, as determined necessary by BLM/DSL personnel, and in accord with county weed board procedures.

(9) All drill fluids would be contained onsite using sumps or portable pits and not allowed to flow overland into waterways.

(10) During the period of operation a locked gate would be maintained on the access road (at the south fenceline in T.36N., R.4E., section 24: NE1/4NW1/4) into the project to support the off-road vehicle (ORV) closure that has been in effect since January 1992.

(11) The camp site would be maintained in conformity with local sanitation codes. Latrine facilities would be located at least 200 feet away from drainages. Other waste products (dishwater, shower water, etc.) would be disposed at least 50 feet away from Tootsie Creek.

Reclamation Plan

These reclamation measures are part of the proposed Plan of Operations:

(1) Drill hole surface casing would be pulled, or cut off 18 inches below the surface. Drill holes would be plugged with bentonite pellets (3/8 to 3/4" diameter) from bottom to top. Cuttings would be disposed of down hole, above the static water level, or spread on the road surface. The upper 5 feet of the hole would be cemented to the surface. Any excess drill fluids would be spread on the road surface at a rate which precludes surface runoff. The operator would maintain a well log for each drill hole that records: (1) hole inclination and direction; (2) drilled interval with depth to groundwater; and (3) estimated amount of water produced or encountered at each interval. This data would be used to allow the BLM/DSL inspector to assess the need for modification of plugging requirements in the case of multiple aquifers or aquifers with artesian pressure.

(2) All roads, trenches and drill sites would be regraded to the original contour to the extent determined practical by BLM/DSL inspection. A Cat 225 excavator, or its equivalent, would be used to reach down and pull up sidecast. Slash, where present, would be spread on the fill slope for erosion control. Biodegradable erosion control matting would be used at sites with high erosion potential.

(3) Disturbed areas would be seeded with this mixture of pure live seed (PLS):

Bluebunch Wheatgrass (Secar)	10 lb/acre
Thickspike Wheatgrass (Critana)	4 lb/acre
Sheep Fescue (Covar)	7 lb/acre
Slender Wheatgrass	4 lb/acre
	25 lb/acre (PLS)

The seedmix would be certified to be free of noxious plant seed. Seed would be broadcast in the fall, prior to soil freeze up. After seed is broadcast a mulch may be required on prior selected exposed sites that lack significant topsoil or cover. Broadcast seeding would not take place in winds over 10 miles per hour. If difficulty is encountered in keeping livestock or wildlife off reclaimed areas, an alternate seedmix may be used or minor fencing of selected areas would be used until revegetation is complete.

(4) All refuse etc. associated with the exploration program would be collected and disposed of at a state approved landfill or disposal site. All used oils, lubricants, filters and parts would be packed out of the project area.

MODIFIED ACTION ALTERNATIVE

This alternative would approve a modified Plan of Operations that did not include road construction, trenching, or drilling on the ridge where Devil's Chimney Cave is located. In addition, the campsite would not be located in the Tootsie Creek basin under this alternative.

The proposed exploration, operation and reclamation plan would be identical to that described under the proposed action alternative, with the exception that 2,760 feet of new and reopened exploration road/trench and four drill sites near Devil's Chimney Cave would not be constructed. This is the road segment that begins at the switchback in the northeast corner of Section 30, T.36 N., R.5 E. (Figure 3), continues northeast onto the ridge where the cave is located in Section 20, and crosses the hiking trial.

Under this alternative the disturbance by ownership would be as shown in Table 2.

TABLE 2
MODIFIED ACTION ALTERNATIVE DISTURBANCE BY OWNERSHIP

	US surf US min	US surf Priv min	Priv surf US min	Priv surf Priv min	Total
Existing Trail/New trench	1,800'(4)				1,800' (4)
Reopened Road Access Only	400'(0)				400' (0)
Previously Built Road/trench	7,650'(0)		550'(7)	1,560'(0)	9,760' (7)
NewRoad/trench	7,740'*(14)	1,570'(6)	3,500'(1)	270'(2)	13,080' (23)
TOTALS	17,590' (18)	1,570'(6)	4,050'(8)	1,830'(2)	25,040' (34)

Estimated number of drill sites shown in parentheses.

Source: BLM modified Table 1.

* Includes possible 1500 feet in Breed Creek for access

NO ACTION ALTERNATIVE

This alternative would deny the Plan of Operations to conduct road building or drilling activities. It should be noted that in accordance with the General Mining Law and BLM surface management regulations 43 CFR 3809, if mineral activities can be conducted so as not to cause unnecessary or undue degradation, a Plan of Operations must be approved. Similarly, DSL would issue an Exploration License if reclamation of the disturbed area is technically feasible and compliance with water quality laws and standards is assured.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Helicopter supported drilling was considered, but would not achieve the geologic information collection purpose of the activity. The road/trench phase of the exploration program is essential to assess bedrock structure and mineralization trends. Only after considering results from the trenching phase can the operator select appropriate locations and orientation for evaluation of the mineral occurrence at depth by drilling. Without road/trench construction, a helicopter supported drilling program would yield only random information; and would not provide an accurate assessment of the area's mineral potential. This alternative is therefore not viable and is not further discussed in this analysis.

COMPARISON OF DISTURBANCES

Table 3 shows by alternative the amount of past disturbance in the project area due to work done by SFPM and Cominco. The "New Disturbance" column shows what Manhattan would create in areas that had not already been disturbed by SFPM/Cominco. The "Cumulative" column shows what the total amount of past and new disturbance would be under each alternative.

TABLE 3
ALTERNATIVES AND DISTURBANCE*

	Proposed Action Alternative					
	Cominco/ SFPM Past Disturbance		New Disturbance In Proposed Action		Cumulative Amount of Disturbance	
Surface	footage	acres	footage	acres	footage	acres
FEDERAL	9,744	7.8	10,950	8.8	20,694	16.6
PRIVATE	4,292	3.5	3,850	3.1	8,142	6.6
TOTALS	14,036	11.3	14,800	11.9	28,836	23.2

	Modified Action Alternative					
	Cominco/ SFPM Past Disturbance		New Disturbance In Proposed Action		Cumulative Amount of Disturbance	
Surface	footage	acres	footage	acres	footage	acres
FEDERAL	9,744	7.8	9,310	7.5	19,054	15.3
PRIVATE	4,292	3.5	3,770	3.0	8,062	6.5
TOTALS	14,036	11.3	13,080	10.5	27,116	21.8

	No Action Alternative					
	Cominco/ SFPM Past Disturbance		New Disturbance In Proposed Action		Cumulative Amount of Disturbance	
Surface	footage	acres	footage	acres	footage	acres
FEDERAL	9,744	7.8	0	0	9,744	7.8
PRIVATE	4,292	3.5	0	0	4,292	3.5
TOTALS	14,036	11.3	0	0	14,03	11.3

*Acreage figure based on maximum width of 35 feet.

Source: BLM, 1992.

CHAPTER 3
AFFECTED ENVIRONMENT

The following resources are not present or are not affected by the proposed action or alternatives and are not considered further in this EIS: farmlands, floodplains, wetlands, wild and scenic rivers, and wilderness.

CLIMATE AND AIR QUALITY

The climate of the Sweet Grass Hills is semiarid. Average annual precipitation is 18 to 20 inches, while Chester, 20 miles to the south, receives 10 to 12 inches. May through August is generally the wettest time of the year with approximately 65% of the annual precipitation occurring during this period. The average annual temperature is 40° F, with extremes ranging from 100° F for short periods during the summer to -50° F during severe winters. The average growing season is 90 days.

Air quality is good to excellent in the higher elevations. Dust clouds can periodically be observed on the surrounding plains during dry periods due to agriculture practices and from vehicle traffic on unpaved roads.

MINERALS AND GEOLOGY

East Butte is the eastern most of three volcanic intrusive centers located near the Canadian border in northern Toole and Liberty Counties, Montana. The butte is composed essentially of a porphyritic syenite intruded into upper Paleozoic and Mesozoic sedimentary rocks. The intrusion is believed to have occurred in Eocene time, approximately 50 million years ago (Ross, 1950). The sedimentary rocks have been uplifted and are exposed adjacent to the intrusive bodies. Isolated blocks of sedimentary rock are also contained within the intrusions. Numerous dikes and sills radiate from the center of the uplifts. The sedimentary rocks, particularly limestone, have been chemically and physically altered due to contact metamorphism and hydrothermal action associated with the igneous activity.

Devil's Chimney Cave is within the project area. The cave is a roughly circular solution cavity, or room, within the limestone formation. The room is about 50-feet across with a 10-foot diameter opening to the surface 40 feet above the cave floor. No speleothems were observed inside the cave (Campbell, 1978). There is a large amount of break-down material on the cave floor.

Montana State University (MSU) conducted preliminary investigations of less than one-half of one percent of the cave break-down deposits in the early 1970s. Numerous faunal remains, some of which exhibited modification, were recovered during the excavations. The exploratory testing conducted by MSU established the fact that Devil's Chimney cave does contain Holocene faunal remains. The cave has the potential to contribute important information to the paleo-environmental record on the northern plains.

The Sweet Grass Hills have a history of prospecting and mining for gold, silver, iron and fluorite. Current economic interest is focused on gold-lode deposits as opposed to the historic placer mining for gold that occurred in portions of East and Middle Buttes. Concentrations of gold and silver occur along the syenite-limestone contact and within the syenite. There are 130 unpatented mining claims and numerous patented mining claims located on East Butte. The area is classified as having high occurrence potential and moderate development potential for precious metal deposits (West HiLine RMP, 1988).

There are two types of gold mineralization occurring in the project area. Mineralization hosted within the syenite porphyry occurs along the South Fork of Tootsie Creek near the intersection of Sections 19, 20, 29 and 30 (Figure 3). The gold is in a stockwork system of thin veins trending roughly east-west. Bedrock in much of this area is obscured by stabilized talus. The gold/silver ratio is approximately 1:1 (Gavin, 1991).

A second type of mineralization occurs in the contact zone between the syenite porphyry and the steeply dipping recrystallized and silicified limestone of the Mission Canyon Formation. This contact zone also contains numerous dikes and sills (small intrusions) of syenite porphyry. Gold occurs in limestone-solution breccia and marble breccia in the Mission Canyon Formation and in the porphyry. The solution breccia horizon contains abundant amounts of disseminated limonite, silicification, open-space filling with calcite and gypsum, and disseminated to massive fluorite. This contact zone extends for approximately one-half mile northwest and three-quarters of a mile southeast of the Devil's Chimney area (Gavin, 1991).

Numerous oil and gas fields have been developed on the flanks of the Sweet Grass Hills and adjacent plains. The nearest production is some 3 miles northeast of the project area at the Bears Den Field. The nearest test well was drilled in 1964 in Section 33, T. 36 N., R. 5 E., 2 miles southeast of the project area.

HYDROLOGY

Surface Water - Streams in the project area are intermittent although short sections of Tootsie and Iron Creeks appear to be perennial. They flow in response to snow melt and intense summer storms. The perennial portions are recharged from snow melt and rain infiltrating the surface soils and moving laterally toward the creeks where the water reappears in the drainage bottoms. This perennial flow shortly disappears into limestones exposed by the incised channels. Tootsie and Iron Creeks, principal tributaries of the project area, join on the east flank of East Butte then turn south eventually flowing into the Marias River below Tiber Reservoir. Sage Creek, the first major tributary north of Tootsie Creek and outside the project area, flows in an easterly direction joining Big Sandy Creek and finally converging with the Milk River below Fresno Reservoir. Water Samples taken from Tootsie Creek (NE1/4 SE1/4, Section 20, T. 36 N., R. 5 E.) show excellent chemical water quality (Wardell, 1992).

Groundwater - Groundwater flow radiates away from the Sweet Grass Hills but regionally is to the east-northeast. No groundwater developments are present in the project area. Numerous springs and seeps occur around the margins of the Sweet Grass Hills. They undoubtedly receive some of their recharge from the exposed bedrock outcrops within the hills. The soils of the Sweet Grass Hills are well drained and the water percolating through these soils recharge the shallow aquifers in the region.

Sage Creek County Water District - The water district was formed in 1983, to develop a water supply system for rural households throughout northern Liberty County. The developed water source is located in an alluvial aquifer below the mouth of Sage Creek Canyon in T. 36 N., R. 5 E., Section 9, SW1/4NE1/4 (Figure 4). This is approximately 3 miles northeast of the exploration project and in the next drainage north of Tootsie Creek.

The collector well was installed in September of 1984. It consists of a 20-foot deep cement cassion with one lateral projecting 30-feet southwest, and another lateral projecting 20-feet to the northeast. The laterals are 8-inch slotted plastic pipe set at a depth of 17 feet.

The collector well is located in the alluvial material of Sage Creek. The alluvium in the upper portion of the valley consists of coarse sand, gravel and cobbles with substantial amounts of fine sand and silty particles. Twenty-five feet or more of this material occurs at the upper (western) end of the valley. Near the collector well, one or more lens of glacial clay-till material is found midway through the gravel profile. The site was part of a complex glacial ice-marginal environment during continental glaciation of the past hundred thousand years. The depth to the base of the gravel zone varies from 13 to 17 feet. The clay becomes more abundant and the thickness of the gravel decreases down the valley. The clay lens locally creates a dual aquifer system, with the lower gravel bed being slightly confined. This clay lens probably acts as a subsurface dam to groundwater flow; this raises the water table to above ground surface and causes Sage Creek to begin to flow at the surface at the collector-well site, during normal conditions (Osborne and Zaluski, 1985).

The Montana Bureau of Mines and Geology (MBMG) conducted a preliminary assessment of the Sage Creek alluvial aquifer in January 1984, and found the anticipated groundwater withdrawal rate could be sustained for 20 to 40 days, in the absence of any recharge, with little observable impact on the stream flow of Sage Creek (Osborne and Zaluski, 1985).

The collector well discharged a constant 120 gallons per minute (gpm) during a 31-day flow test from October 1 through November 1, 1984. The recharge sources during the aquifer test consisted of Sage Creek, located about 30 feet from the end of the southern lateral and snowmelt percolation into the aquifer. Sage Creek was fed by runoff from snowmelt in the Sweet Grass Hills. Data from the U.S. Geological Survey stream gaging station on Sage Creek, near the DaFoe Ranch, indicate that discharge of Sage Creek was 2.0 cubic feet per second during October of 1984. This is about twice the average October flow of the past six previous years of record. Precipitation in the region was 71% above normal in September, and 57% above normal in October, 1984 (Osborne and Zaluski, 1985).

Samples taken during late 1984, show groundwater from the Sage Creek alluvial aquifer is of excellent chemical quality. The concentration of dissolved solids is 200 to 220 milligrams per liter (mg/l), which is very good for domestic water supplies. Dissolved iron content is very low. All trace element concentrations were either very low or below the detection limit. The only unfavorable characteristic of the alluvial groundwater is hardness. The two samples had 179 and 177 mg/l hardness as $CaCO_3$ and are classified as hard (Osborne and Zaluski, 1985). More recent sampling by DSL in 1988, shows continued excellent water quality (BLM file MTM-76046, 1989).

Low iron and high calcium contents indicate Sage Creek is at least partially being recharged by groundwater, probably from limestone formations in the Madison Group.

Concerns have been expressed by members of the Sage Creek Water District that exploration drill holes may introduce contaminates into their water supply system. The surface topography would prevent any overland flow from the project area from reaching surface waters in the Sage Creek Drainage until below Ft. Peck Dam in extreme eastern Montana, a distance of approximately 230 miles.

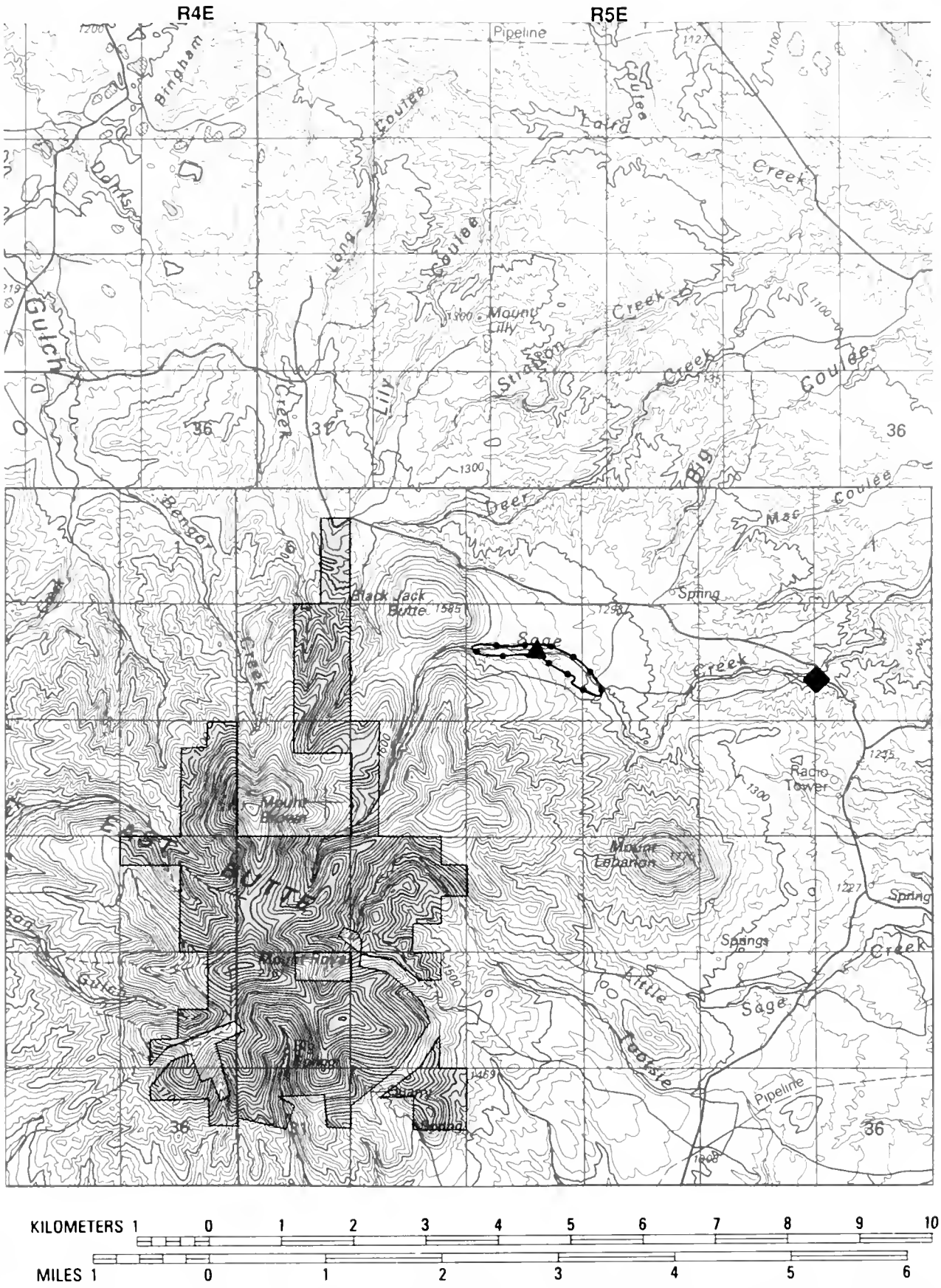

Figure 4 - Location of Sage Creek Alluvial Aquifer and Collector Well

LEGEND

▲ Collector Well (T36N., R5E. SEC 9: SW1/2NE1/4.)

◆ USGS Gaging Station

Alluvial Aquifer Boundary

BLM Surface

Known geologic structure maps (Montana Geological Society, 1985 and Bateman, 1969) indicate a groundwater divide between Tootsie Creek and Sage Creek. Groundwaters in the project area flow east-southeast while the general flow in formations beneath Sage Creek are to the east-northeast. Geologic mapping of the Tootsie Creek-Sage Creek area does not indicate any faulting that would force groundwaters from the project area toward the Sage Creek Water District system. The regional flow of all groundwaters (except alluvial aquifers) in the vicinity of the Sweet Grass Hills is to the east-northeast. Groundwaters from the project area would not mix with aquifers contributing to the Sage Creek Water District system until far down gradient of the system's well.

SOILS

The area is relatively steep and dissected by deep drainages. Most of the land is on slopes between 40 and 60% with elevations ranging from 5,100 to about 6,400 feet.

The soils are mainly deep, well drained, and loamy-skeletal (tentatively identified as *Repp*, *Whitecow* and *Tropal* series) with 35 to 60% rock fragments by volume. The rooting and wetting depth of these moderately permeable soils are more than 60 inches. The water erosion hazard on these soils when bare is high due to steep to very steep mountain slopes. There are shallow and moderately deep soils (tentatively identified as *Warneke*, *Hughesville* and *Skaggs* series) over bedrock on ridges and convex slopes associated with the limestone bedrock outcrops. These soils usually produce vegetation of less quality and quantity than the deep soils on smooth to concave lower slopes. Revegetation of soils in the project area, given normal precipitation, has been moderately to highly successful.

VEGETATION

The project is in an area where Douglas fir might be expected to dominate. However, the climax forest overstory has been lost (through fire) and Douglas fir is now only a minor component of the vegetation. It mostly occurs only as scattered undergrowth beneath an overstory of lodgepole pine and limber pine. There are a few mature Douglas fir trees in the area. The overstory timber stand is mostly pole-sized lodgepole pine less than 9-inches in diameter.

Dominant understory vegetation includes creeping juniper, cinquefoil, kinnikinnick, snowberry and Oregon grape. The small parks are usually grass covered and include rough fescue, bluebunch wheatgrass, Idaho fescue and creeping juniper.

Some slopes consist almost entirely of scree or talus (coarse angular rocks or boulders) with no vegetation.

Potential candidate threatened or endangered plant species occur in the Sweet Grass Hills (Western Technology & Engineering, 1989) however, none have been identified in the project area.

WILDLIFE

The Sweet Grass Hills provide important mountainous and forested habitats for elk, mule deer, and white-tailed deer. The dense forests, extreme topographic relief and lush deciduous drainages that trail from the Hills are unique and generate considerable interest to the local residents because of their wildlife values.

Approximately 300 elk inhabit the Hills, with about half using East Butte. Radio relocation data indicate that interchange between buttes, especially by females, is probably uncommon (Olson, 1991, Figure 5).

Most winter use by elk on East Butte has been recorded east of Mount Royal, in the general locale of the proposed action, and northward toward an area between Mount Brown and Mount Lebanon (Figure 5). During winter, elk would most commonly feed on wind swept, warm, southern exposures, where grasses are available; and bed in the nearest timber which provides adequate thermal cover. A preferred wintering area occurs in T. 36 N., R. 5 E., Section 29, S1/2. This is east and south of the exploration target area.

Elk calving often occurs on the edges of the winter range, at the lowest timber extremities, and peaks about June 1st. No relocations were made during this period on the Iron Creek winter range. Elk were present between Mount Lebanon and Mount Brown, and in the Breed Creek drainage, between May and July (Figure 5).

During the summer, elk use higher elevations, where forbs stay succulent and then proceed to drainage bottoms and alfalfa fields when desiccation (drying) of forbs occurs. Summer and fall elk distribution appears more scattered. Fall distribution is likely a result of hunting pressure, with elk concentrations probably due to hunting closures on private lands, or other inaccessible situations. The area in the locale of the project is relatively inaccessible and probably serves as a security area during much of the hunting season.

The most common big-game animal in the Sweet Grass Hills is the mule deer. Densities as high as 22 deer per square mile have been recorded. Mule deer can probably be found in most areas throughout the entire year, but tend to prefer south-facing slopes during the winter with heaviest

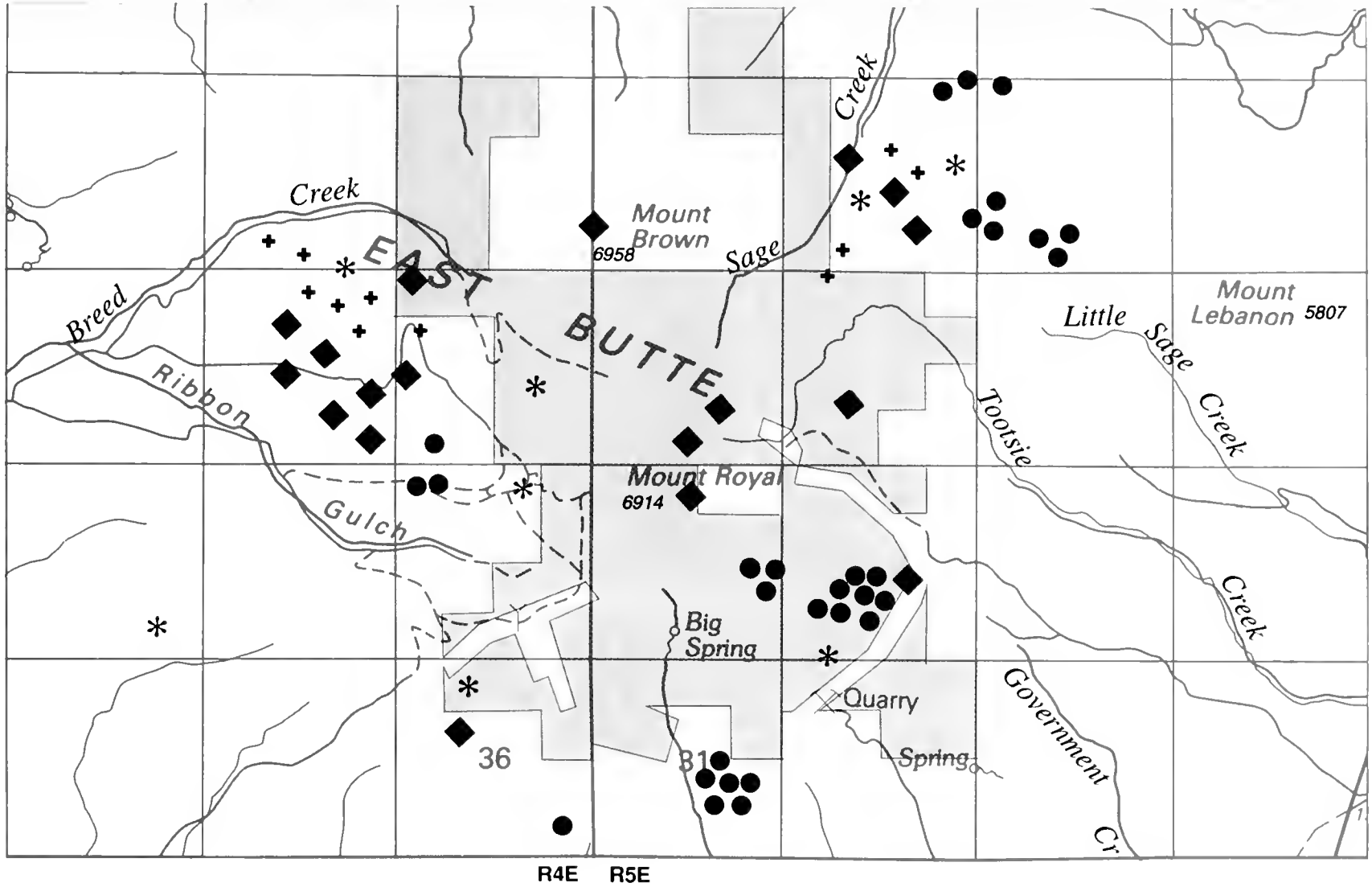

Figure 5 – Radio Relocation Data of Elk
(Data collected during 1987-88 on the East Butte of the Sweetgrass Hills)

Scale 1:50 000

● 12/15 - 4/30
* 7/2 - 9/15
▭ BLM Surface
\+ 5/1 - 7/1
◆ 9/16 - 12/14

-N-

concentrations at the prairie/timber edges. The area south of Iron Creek, used by elk in the winter, also carries high numbers of mule deer (Gary Olson, Per. Comm.). They use drainage bottoms and hay and alfalfa crop lands during all seasons. Most use of higher elevation timbered areas would be during the summer. The areas influenced by previous exploration activity are classified as year-round habitat, but would probably be most important to mule deer during the winter period.

White-tailed deer are common to all drainages extending from the hills. The rank deciduous-shrub vegetation lining these drainages creates excellent cover as well as forage for whitetails. The heads of some of these drainages lie mid-slope in the hills and the deer habitat can extend for over 5 miles down their length. Hay cropland can be important as feeding sites for the whitetails. Whitetail habitat is not prevalent in the vicinity of the project.

In addition to the above listed big game species, pronghorn antelope and sharp-tailed grouse occupy the foothills and prairies surrounding the Hills.

No small mammal or bird inventories have been undertaken in the project area. Some undoubtedly occur, but it is suspected the variety and numbers are small due to the harshness of the environment. No breeding pairs of raptors have been observed in the immediate vicinity or influence zone of the proposed project.

Approximately 100 species of summer birds use the Sweet Grass Hills. Eighteen of these species are considered montane[1], however densities of individual birds are low (Thompson, 1978).

The U.S. Fish and Wildlife Service has indicated that federally-listed endangered and threatened species which may occur in the general locale are the bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), piping plover (*Charadrius melodus*), least tern (*Sterna antillarum*), and black-footed ferret (*Mustela nigripes*).

Habitats for the latter three species are not found in the project area. The project area contains no wetlands necessary for least tern or piping plover occupancy. No prairie dog towns, considered necessary habitat for black-footed ferret, are in the project area.

Both peregrine falcons and bald eagles may occur in the area as spring and/or fall migrants. No peregrine falcon or bald eagle nest territories have been recorded in the Sweet Grass Hills.

LAND USE

Lands involved in the exploration project consists of a mixture of private and BLM-managed federal lands (Table 1). This includes lands where there is BLM-managed surface overlying private mineral estate and lands where there is private surface over federal mineral estate.

The project area has one grazing lease active from June 1 through October 31, consisting of 1611.96 acres of BLM lands with 244 animal unit months. Most of the suitable grazing land is on the lower slopes of the allotment. The area where exploration would occur is in loamy-skeletal soils with nonproductive timber and understory providing little or no grazing benefits.

The main recreational use of the area is hiking and hunting for deer and elk. Access to the area is attainable only through private lands. During the summer months hikers park in the Iron Creek drainage and hike along the old jeep trail to the Devil's Chimney Cave (Figure 2).

There are 24 communication site rights-of-way issued for Mount Royal which are housed in ten buildings (Figure 2). This is a major communication facility site for this area of the state.

The Bureau of Reclamation has a withdrawal on 570.05 acres bordering the project area on the southeast. This withdrawal was made to secure a riprap source for Reclamation projects. The actual riprap quarry was developed on private lands (Figure 2).

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

BLM-managed lands on East Butte have been designated for special management as an area of critical environmental concern (ACEC) (West Hiline Resource Management Plan, BLM, 1992). The main management objectives for the Sweet Grass Hills ACEC are to protect habitat which has high potential for reintroduction of the endangered peregrine falcon (West Butte, some 20 miles west of the project area); protect areas of traditional religious importance to Native American Tribes; and protect seasonally important elk and deer habitat. Other activities, such as mineral development, are to be conditioned to the extent feasible and allowed by law to be compatible with the ACEC designation.

[1] Designating a cool, moist ecological zone usuallylocated near the timberline and usually dominated by evergreen trees.

NOISE AND VISUAL RESOURCES

There is normally no outside noise detectable in the project area, with the exception of an occasional military aircraft.

The project area is located in the basin, or amphitheater area, northeast of Mount Royal, and generally has good visual resource quality. Evidence of historic mining activity such as a waste rock dump, old cabin ruins, old haul road grade and numerous prospect pits can be seen but do not dominate the scenery. The communication sites on Mount Royal are discernible from most parts of the basin. From ridgecrests and peaks, the cultivated plains surrounding East Butte may be seen for up to 100 miles on a clear day. The most notable visual intrusion in the area is from the roadcuts made for exploration activities in 1986 and 1989, that have not yet completely revegetated.

CULTURAL

The plains surrounding the Sweet Grass Hills have evidence of human use dating back several thousand years. Early whites in the region noted buffalo hunting parties of Assiniboine, Blackfeet, Plains Cree, Gros Ventre and others in the area. Evidence of early human use on the surrounding plains includes abundant tipi ring sites in addition to extensive hunting complexes. In the last century, ranching and mining have also left their mark on the area.

The unique geography of the Hills made them an important source of various plants, including sweetgrass (*Hierochloe odorata*), otherwise not locally available on the extensive plains. The unique geology of the Hills also made them important for the extraction of various mineral resources for Native Americans and later for white miners.

Historic Use - The Sweet Grass Hills can be expected to have evidence of human use from prehistoric through historic times. Although few sites have been recorded, the surrounding plains have yielded prehistoric properties extending back in time several thousand years. The prehistoric properties show subsistence activities of hunting and gathering, a nomadic lifeway of briefly used habitation sites, and evidence of Plains Indian religion, such as vision quest structures. Historic use of the area during the last 100 years includes ranching, farming and mining as well as historic Indian use for religious purposes such as gathering sacred materials and vision questing.

Historic and prehistoric resources were located during previous cultural resource inventories in and around the Sweetgrass Hills. Vision quest sites were documented on the East Butte as early as 1853 by A.W. Tinkman (Dormaar, 1988). J.F. Dormaar (1988) identified other vision quest sites on East Butte, including two along the ridge east of Mount Royal. Stone circle sites are present on the prairies that surround East Butte. Historic resources include mining and ranching remains.

Site Identification - BLM files were reviewed, the site files at the University of Montana were checked and the Montana State Historic Preservation Office was contacted regarding historic properties which might be in the project vicinity. The SHPO provided a draft National Register of Historic Places nomination of the Sweet Grass Hills as a National Register Historic District. According to that draft nomination:

The Sweetgrass Hills Historic District is a discontinuous district which encompasses three distinct buttes or small mountains, which collectively comprise the Sweetgrass Hills. The historic district takes in the cultural landscape areas associated with these buttes, including the natural environment, Devils Chimney cave, and cultural remains of sites and structures associated with ceremonial, subsistence and tribal military activities in the Hills (SHPO, 1992).

The SHPO draft nomination has not been submitted to the State Historic Preservation Review Board which by law precedes submission to the National Register. However, the BLM has submitted documentation on the Sweet Grass Hills to the Keeper of the National Register for a determination of eligibility.

A BLM Class III cultural inventory was conducted on April 29-30, 1992. The inventory resulted in the recordation of an early mining site, the patented Malvina Claim, and the Devil's Chimney Cave. Neither the cave nor the early mine site are on ground proposed for physical disturbance by the exploration proposal. However, the Devil's Chimney Cave, a traditional cultural property and part of a district eligible to the National Register[2], would be adversely affected by the proposed exploration as defined by 36 CFR 800 regulations. The setting contributes to this eligibility and therefore alterations to the setting are considered adverse effects.

Native American Graves Repatriation & Protection Act (NAGPRA) - There are no known burials in the areas proposed for disturbance. In the event that such a discovery was made, compliance with the NAGPRA or the Montana Human Remains and Burial Protection law would be undertaken as appropriate.

[2] BLM and the Montana SHPO agree that the undertaking is within a National Register District but the boundaries of the district had not been determined by the Keeper of the Register as of this writing.

SOCIAL

Population - Liberty County's population was 2,295 in 1990, 11 of whom are Native American. This is 1.5% below the 1980 population estimate of 2,329. Chester is the county's only incorporated city, with a 1990 population of 942. This represents a 2.2% decline in population since 1980, when the population totaled 963 (U.S. Bureau of the Census, 1990). Although the population has declined in Chester and across Liberty County, it has remained relatively stable over time.

Social Conditions - Social well being indicators for Liberty County present the mix of positive and negative factors associated with rural areas. Positive factors include the area's remoteness and sparse population which result in freedom from urban problems such as high crime rates and overcrowding. Divorce rates are low compared to state statistics, outdoor recreational opportunities are plentiful and family ranching operations remain predominant.

Liberty County is lacking some basic services. The number of physicians per 100,000 is lower than for the state and nation, education levels are lower than for the state and the proportion of housing lacking plumbing facilities (a housing quality indicator) is higher than for the state. Liberty County has a lower proportion of people in the working age groups (18 to 65 years) than the state as a whole. People in these age groups typically move out of the area to attend school or find employment. However, despite these drawbacks, residents of traditional ranching areas in the western United States typically feel this lifestyle offers a very positive environment for individuals and families.

Local residents, particularly area ranchers, Native Americans from a variety of Tribes, and some Montana environmental protection organizations are vocal in their opposition to exploration and mining in the Sweet Grass Hills. Though the action under consideration is exploration, many fear it would ultimately result in mining. Therefore it is difficult to separate concerns about exploration from those associated with mining. Concerns include damage to surface and groundwater supplies, loss of the area's natural beauty, disturbance of wildlife habitat and loss of recreation opportunities. Concerns about exploration and mining in the Sweet Grass Hills are long standing—they were documented during the preparation of the West HiLine RMP (1987 - 1988) and during public comment for the East Butte Exploration Project in 1989.

American Indian Religious Freedom Act Concerns - The Sweet Grass Hills are important as a religious and cultural use area for Native Americans (West HiLine RMP, 1988). The Sweetgrass Hills are within the historic range of various Native American groups and are known to have had an important place in their religions. The Hills are known to have been used by Blackfeet, Cree, Assiniboine, Gros Ventre, Northern Cheyenne, Crow and other groups. These people used the Hills for religious and traditional activities including hunting, plant and mineral resource gathering, and specific religious activities, especially vision questing.

Vision questing is practiced by all of the groups known to have ranged into the Hills. A vision quest involves an individual petitioning supernatural powers for aid. It is commonly done in isolation from the community for a period of time, while fasting, praying and making offerings (Deaver, 1986, Pg 40).

Fasting, vision questing and other forms of traditional worship require certain conditions to be successful. Fasting and vision questing require isolation from audible and visual interferences or disturbances. According to an Assiniboine elder, "The fasting must be carried on alone and in a quiet, isolated area with no unnatural distractions" (McConnell, 1990 BLM Affidavit).

Concern has been expressed about disruption of these traditional practices in the Sweet Grass Hills, particularly by the Blackfeet and Chippewa-Cree. In addition to these groups, the Hills are known to be important for religious practices by the Cree and Piegan of Canada as well as Assiniboine and Gros Ventre in Montana. Many comments were received stating that the entire Sweet Grass Hills are sacred, and Devil's Chimney Cave was emphasized.

Native American groups have been consulted with to identify specific concerns in conjunction with past projects[3]. In June 1986, Blackfeet traditionalists visited the area with BLM personnel and emphasized the spiritual importance of the Hills to the Blackfeet People. Another field visit to the general project area was held on April 20, 1989, with representatives from the Blackfeet Tribe, the Chippewa Cree and the Original Chippewa Cree. The representatives told of the history of religious use they had in the area and its spiritual importance. Both groups emphasized the significance of Devil's Chimney Cave and the need to protect it from physical and spiritual intrusion. To better understand their concerns and the nature of the potential impacts, some specifics are important.

[3] Efforts at consultation for the current proposed action have included letters and phone calls to various traditional leaders and a public scoping meeting in Chester. Native American groups were also invited to discuss their concerns through private meetings to be arranged for their convenience on or offsite. No requests for private and/or onsite meetings were received (as of 12/18/92).

Blackfeet

According to Deaver (1986, pg 43), the Blackfeet believe in an animate universe that contains powers which may be petitioned by man. Their cosmology is based on a three-tiered conception of the world: Above Persons, Ground Persons, and Underwater Persons. These classes of supernaturals include some with human form and some with animal form. These supernaturals have powers which they can transfer to men if they choose to do so. These powers may be sought deliberately or may simply come when a man is alone. The powers come through dreams in which the supernatural visits and instructs the individual (Deaver 1986, pg 44).

One of the Above Persons, Napi, is responsible for creating the major physical features of the Blackfeet world. During creation he lays down to rest and these resting places are called Napi figures. The Sweet Grass Hills are such a feature (Deaver, 1986, pg 46).

Mike Swims Under, a Blackfeet elder, was told by his father that the Hills were sacred and must be preserved. According to him they are considered the most important place to get sweetgrass and sweetpine for ceremonies as they are the most powerful sweetgrass and sweetpine. He also reports fasting in the Hills saying "...people fasted there for power to get a good living and good luck" (Swims Under, 1986, BLM Vol 1).

Chippewa-Cree

According to Deaver (1986, pg 104), the Chippewa-Cree tribe is composed of Plains Cree, Plains Ojibiwa and Metis who joined together as a political entity when trying to find a place to live. Not all of these people became associated with the Rocky Boy Reservation and some Montana communities have ethnic enclaves which continue to practice their traditional religion.

The worldview of the traditional Plains Cree and Plains Ojibiwa included the concept of the Manito, a supernatural force that pervades the natural world, within a four-tiered universe. Each tier is more beautiful than the lower one. The highest tier is the home of the Great Manito, sometimes regarded as the creator. Sweetgrass Man is on this level and is sometimes depicted as the leader of all other Manitos (Deaver, 1986, pg 105).

The Chippewa-Cree consider the Sweet Grass Hills and especially Devil's Chimney Cave sacred as well as historically important. According to their oral tradition, this is where the creator decided the future of the earth and of man. The creator will return here at the end of the world and awaken the spirits of those who have left (Raining Bird 1989, BLM Vol. 6).

Chief Broken Arm, signatory to the Stevens Treaty of 1855, vision quested at the Cave as did the legendary Chief Big Bear. Big Bear received a vision instructing him to make the "Chief's Son's Hand" medicine bundle. This medicine bundle is believed to be the one referred to in David Mandlebaum's "The Plains Cree" (1979) and now at the American Museum of Natural History (Spangelo, 1989, BLM Vol. 6).

A value common to many Native Americans is the "spiritual" quality of land. According to Deaver (1986-Pg 3), "Disrespectful manipulation of the earth in this worldview is seen as desecration." In the traditional view such desecration could result in serious consequences. This concern was expressed by the late Art Raining Bird in connection with previous exploration in this area:

"No one ever thought they'd be excavating there. Its as if they're going to take down the shrine meant for the Native Americans. I don't agree with that. If that ever happens, unexplainable things will begin to happen" (Raining Bird, 1986-BLM).

Related Concerns

Both the Blackfeet and the Chippewa-Cree have expressed concern about traditional "paints" or "medicines" gathered on the East Butte (Wagner, 1986-BLM, Vol 1; Stump, 1989, BLM Vol. 6; Chief Stick 1992-BLM). Past reclamation efforts have apparently buried such materials (Stump, 1989, BLM Vol 6; Chief Stick 1992). The water quality of Tootsie Creek is also a concern for traditional religious practices (Chief Stick BLM 1992). Chemical water quality and flow rate is discussed under the Hydrology section.

ECONOMICS

The economy of the area is primarily agricultural, accounting for about 35% of total county employment in 1989. The trade and service sectors account for about 32% of total employment and government employment comprises about 25% of the workforce. The proportion of these sectors to total county employment remains virtually unchanged since 1980, except that government employment increased slightly from 22% of total employment in 1980 to 25% in 1989. Most of this increase has been in state and local government employment (U.S. Bureau of Economic Analysis, REIS, 1991).

The unemployment rate in Liberty County was estimated to be 7.4% in February 1992, the month for which the most

recent data was available. This compares favorably with the statewide unemployment rate, estimated to be 8.3% for the same period. However, the county's unemployment rate is higher than for the same period in the previous two years. In February 1991, the unemployment rate was 5.3% and in February 1990 was 3.2% (Montana Department of Labor and Industry, various years).

Expenditures for hardrock exploration in the Sweet Grass Hills area of Toole and Liberty Counties since 1983, are estimated to be between $1.5 and $2 million, occurring during the field season between May and October (Ernest Lehmann, unpublished letter, 5/4/92). Although the current project area is in Liberty County, both Toole and Liberty Counties are included here because the Sweet Grass Hills area lies in both counties and expenditures were unavailable by county. The average annual expenditures since 1983, are estimated to be $150,000 to $200,000. Expenditures include wages, fuel, equipment rentals, repairs, food, lodging and contract services (such as construction, drilling and helicopter services).

As exploration dollars are spent (direct expenditures) they circulate through the local economy generating additional rounds of spending (secondary spending). This is called the multiplier effect. The sum of direct expenditures and secondary spending is known as the total economic impact. Assuming 50% of average annual expenditures have been spent locally, the total economic impact is estimated to have been between $127,000 and $170,000 annually over the past 10 years (U.S. Bureau of Economic Analysis, RMIS II, 1991).

Crews have consisted of up to five individuals during the field season with additional employment supplied by contractors (Lehmann, 1992). Most of these personnel have been based in Chester (Liberty County) or Shelby (Toole County). Additionally, spending activity is estimated to have contributed up to two jobs in the local area. Thus, total annual employment attributable to exploration activity is estimated to be about seven jobs.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

PROPOSED ACTION (PREFERRED ALTERNATIVE)

This alternative involves construction of approximately 28,000 feet of new access road/trench and drilling at 38 in-road drill sites.

Air Quality

The proposed road/trench construction and drilling would cause minor short-term impacts to air quality in the Tootsie Creek basin.

Road and trench construction would release particulates (dust). Past exploration work created only slight to negligible air quality impacts during construction because the moisture content of the soil material suppressed dust generation.

Of greater impact is the particulate release during drilling. Compressed air is used to circulate the drill cuttings in the upper portion of the exploration hole. The air returned from the hole contains ground rock fragments, part of which are released to the atmosphere. The dust created during drilling would be readily visible in the Tootsie Creek basin when near line-of-site to the drill rig. It would dissipate rapidly due to settlement and dispersion over a short distance. Once the drilling encounters water, typically at about 100 feet, dust generation is suppressed as water is used for circulating the cuttings.

Other impacts to air quality in the project area would occur from construction and drilling equipment and from personal vehicle exhausts. Additional minor impacts to air quality would occur on a broader regional basis due to workers and agency inspectors traveling along unpaved roads into the project area. An estimated daily round trip for two vehicles from either Shelby or Chester is anticipated. These would be minor negative impacts.

Minerals and Geology

Devil's Chimney Cave would not be physically disturbed by the drilling or construction activities. All surface disturbing activities would occur more than 200 feet from the cave. Past exploration drilling and road construction at this distance did not impact the cave. Though not likely, acceleration of the natural cave deterioration processes could occur due to construction on the cave ridge.

The results of exploration would increase the geologic database in the area. This would benefit assessment of the mineral resource potential and provide information necessary for future land use planning. This would be a moderate positive impact.

Hydrology

Road building activities would remove the ground cover, exposing the soils beneath. The potential for erosion from the exposed soils, with sediment deposition in Tootsie Creek, would increase. Runoff from snowmelt and intense summer storms would cause most of the erosion and sedimentation. Erosion potential from the roadbed would be higher on the steeper slopes. Sedimentation would be minimized by installing proper erosion controls (water bars) and interim seeding.

Exploration drilling normally does not introduce significant amounts of contaminants to the groundwater system. The greatest danger of degrading the water quality of an aquifer results from the mixing of waters encountered by the borehole. Water from one aquifer may be of different quality than the others encountered, thereby degrading the higher quality aquifer. All exploration drill holes would be plugged upon abandonment, according to the Reclamation Plan and in conformance with state policy (DSL, 1992) eliminating cross contamination of aquifers and/or introduction of materials from the surface.

No drill holes would be constructed in the recharge area of the Sage Creek Water District system. No impacts to that system or any other groundwaters in the area are anticipated from the proposed action.

Overall negative impacts to surface and groundwater would be negligible.

Soils

The greatest potential impact upon soils would be from constructing and using roads and drill sites. Soil displacement and compaction would occur due to heavy equipment usage, especially in wet weather. In the short term, soil compaction and rutting can lead to accelerated erosion and

sedimentation. This is generally proportional to the acreage disturbed, which is largest under this alternative.

Access between drill sites 5 and 13 (Figure 3) would involve walking equipment about 150 feet down an intermittent stream channel on the West Fork of Tootsie Creek. Flow at this location is extremely low to non-existent during the operating season. This approach would save substantial earthwork on the steep streambank opposite drill site 5 which has a higher potential for soil erosion and sedimentation.

Rehandling soil material from previously reclaimed roads to be reopened would not reduce the soil suitability for reclamation. The more selective placement and control available by using an excavator for construction and reclamation (instead of a dozer) would enhance the conservation of soil resources and their availability at reclamation.

The long-term impacts to soil resources would be negligile after utilizing the mitigating measures and Reclamation Plan.

Vegetation

All vegetation within the road width would be removed during construction and stockpiled at the toe of the fill slope. Much of the route is through forested areas and would require tree cutting in advance of construction. All disturbed areas would be reseeded with a seed mixture to enhance vegetation reestablishment (see Reclamation Plan). Trees removed during construction would be spread upon the reshaped road at reclamation to provide increased erosion control and microsites for seed germination. Natural reestablishment of trees on the disturbed area would occur, but probably take five to ten years after reclamation activity is completed.

None of the plants noted in the rare plant evaluation (*Rununculus cardiophyllus, Claytonia lanceolata, Halimolobos virgata*) have been located on the project site. No impacts are expected to occur to rare plants.

Noxious plants may invade the disturbed areas, despite the precautions taken during operations. If this occurs they would be controlled by the operator using means allowed by the local weed control board and BLM policy guidelines.

Overall negative impacts to vegetation would be short-term and minor.

Wildlife

Upgrading and building new roads, in an area of previously limited vehicular access, would create additional impacts to deer and elk if the road were left open to access by hunters and the general public. Closure and reclamation would reduce negative impacts to short-term duration, associated with construction activity.

During exploration activity, the most significant impact to elk would occur if the operator was working during the December through May period, as evidenced by radio relocation data (Figure 5). Elk calving may occur near the winter range around June 1st. The least disturbing operating period would be from June 15 through December 1st; which is in the operator's proposal. Since the area of disturbance does provide security during the fall hunting season, elk may be displaced and subject to additional stress and possible over-harvest. This negative impact would be short-term and not significant.

Effects on Mule deer would be similar to those occurring to elk.

Small animals would not avoid the effects of exploration as easily, and if they cannot be displaced to unoccupied habitat would be subject to injury or death. As the area rejuvenates upon reclamation, habitat spaces would once again be occupied by this class of wildlife.

No other species would be impacted by the proposal. No threatened or endangered species would be affected by this alternative.

Overall the negative impacts to wildlife would be short-term and minor.

Land Use

Grazing - No impacts are expected to livestock grazing and there would only be a negligible loss of AUMs since this timbered area provides less than one-tenth of an AUM/acre. This alternative would not require reduction in livestock use; though selected small areas may be fenced to exclude livestock during reclamation.

Recreation - Individuals that use the hiking trail would find their hiking experience impacted by the intrusion of road cuts once they reached the project area. Auditory impacts would occur during actual road/trench construction, drilling, and reclamation. This would be a moderate short-term negative impact. The new access roads would remain

closed to the public and would provide no additional access for game retrieval. This supports the walk-in hunting program favored by private landowners in the area.

Communication Sites - No impacts would occur to users of the Mount Royal communication sites. The activity would not interfere with these right-of-ways.

Areas of Critical Environmental Concern

The proposed action conforms to the six management guidelines (Chapter 1) for hardrock mineral activities that have been prepared to protect the ACEC values.

The exploration activity conducted to date, plus selection of this alternative would not eliminate the values for which the Sweet Grass Hills ACEC was designated. However, the aspect of the ACEC designation associated with Native American traditional cultural values and practices would be moderately impacted (see Social section).

Noise and Visual Resources

Noise - Both road construction and drilling would create discernible noise levels within the Tootsie Creek basin. This would occur primarily during daylight hours. Individuals visiting Devil's Chimney Cave would be able to hear the drilling equipment when work was in progress. This would be a moderate short-term negative impact.

Scenic Values - This alternative would create additional road disturbance with associated visual impacts visible high on the slopes of Mount Royal. One spur road, on the south side of the mountain may be visible from south of East Butte (Figure 3). Upon reclamation visual impacts would be dramatically reduced, though some evidence of disturbance would remain visible for several years due to coloration of the reclaimed road being lighter than the surrounding slopes. Eventually, this would blend into the surrounding landscape through weathering, and revegetation. This would be a moderate negative impact to local scenic values.

Cultural

Historic Properties - There would be an adverse impact under 36 CFR 800 regulations to the proposed National Register Historic District if subsequently determined eligible for listing. The undertaking would be within the district (see Chapter 3). There would be a long-term impact to the integrity of the setting in the Devil's Chimney Cave and Tootsie Creek basin area. However, there would be no impacts to any cultural remains associated with any proposed historic district, nor would there be any disturbance on the other two buttes. It is unlikely that this adverse impact would preclude eligibility to the National Register of Historic Places.

Other potential indirect impacts to Devil's Chimney could include improved vehicular access and the potential for vandalism. The locked gate provided in the operator proposal would prevent unauthorized vehicular access into the area and would eliminate this potential impact.

Social

Individuals and groups concerned about mineral exploration and development may feel a loss of control over what happens in the Sweet Grass Hills, and that their concerns were not given adequate consideration.

Traditional and Religious Use - Native Americans were consulted with in order to identify concerns in conjunction with environmental review of the proposed project. The results of this consultation were a variety of letters, phone conversations and statements at public meetings by many different Native American groups. The Chippewa Cree and Blackfeet from the U.S. and Canada, as well as the Kootenai, Salish, Northern Cheyenne, and Assiniboine have expressed concern and opposition to any exploration in the Sweet Grass Hills.

Several Native American groups attribute varying degrees of traditional cultural and historical importance to the Sweet Grass Hills in general, and to Devil's Chimney Cave in particular. This ranged from those regarding the area as culturally important to others who regard resources in the project vicinity as essential to their group's cultural identity.

The general consensus of these comments is that the area should be protected from the environmental change that is associated with exploration and especially mining. Prevention of environmental change is seen as a way of preserving the spiritual qualities of the area. This concern especially applies to Devil's Chimney Cave and the ridge its on; Tootsie Creek below the cave; and various near surface mineral deposits in this area.

The cultural, historical and spiritual associations of the cave make the risk of impacts to its physical or spiritual integrity particularly unacceptable and in some ways unintelligible to traditional Native Americans. The cultural associations of the cave, as relayed in oral traditions of the Chippewa-Cree, make it irreplaceable to group identity. As such, any action which would accelerate natural erosion of the cave would be a desecration. Although the limestone cave

appears stable, it is possible that drilling and trenching on the ridge above the cave would accelerate its natural deterioration.

The visual solitude sought during vision questing has been impacted previously in the East Butte area by communication sites, exploration roads, canals and the remains of historic mining activities. The proposal would disturb the approach to the cave from the east as well as involving additional disturbance to the west, south and north on the ridge where the cave is located. All approaches to the cave and most of the viewsheds into the Tootsie Creek basin from the surrounding peaks would be affected by these intrusions. These intrusions may be visible for several years even after reclamation.

Visual and auditory intrusion would occur during construction and reclamation activities. The noise and traffic associated with exploration may preclude spiritual use of the cave and Tootsie Creek drainage during operations. The number of traditionalists potentially affected is unknown. According to the Chippewa-Cree at least a dozen men currently at Rocky Boy Reservation have used this place for vision questing (Chief Stick, 1989, BLM Vol 4). In addition to the Chippewa-Cree at Rocky Boy, there are enclaves of traditionalists in several Montana communities (see Chapter 3) and the Blackfeet, Gros Ventre and Assiniboine in Montana, as well as Cree and Piegan in Canada. Each individual may be required to make more than one visit, which compounds the significance of the potential loss of use.

The physical disturbance may negatively impact the spiritual attributes of the area to traditional Native Americans. This impact, if it occurs may not be recoverable, even after reclamation.

The negative impacts of the proposed action to traditional Native American values and practices would be significant. The short-term impact is up to three seasons of non-use by traditional Native Americans because of noise and traffic. This may affect many individuals from Montana and Canada. Long-term impacts include reducing the quality of religious use because of visual intrusions, and perhaps even accelerating the natural deterioration of the cave.

Economics

Annual expenditures and employment would be comparable to expenditures and employment over the past 10 years; however, expenditures could reach $300,000 annually over the 2-year project period (Brian Gavin, personal comm., 1992). It is anticipated that a four-person field crew would work in the area during three field seasons. The annual total economic and employment impacts, including secondary spending, would likely resemble impacts over the past 10 years, but would depend on the availability of support services in the area. This would be a slight positive impact to the local economy.

Cumulative Impacts of the Preferred Alternative

Selecting this alternative would change the total cumulative disturbance level (past and proposed) to over 28,800 feet of road, or about 23 acres (Table 3).

The other activities in the project area would contribute only minor amounts to cumulative effects in combination with the current disturbance and selecting this preferred alternative. The dominant (most impacting) activity occurring in the area is mineral exploration. The other uses such as hiking, hunting, grazing and communication site ROW activity have little added impact on area resources when compared to the exploration activity. A use that comes closest to contributing impacts to the project area would be the location and servicing of the communication sites on Mount Royal. However, these sites are accessed by a road on the opposite side of Mount Royal and would not share traffic with the access road into the exploration area.

There is a small prospecting operation near the head of Breed Creek (T. 36 N., R. 4 E., Section 24: NE1/4). This prospecting operation has been worked intermittently for about 40 years. The current level of activity amounts to only several days per year for purposes of performing assessment work. This prospect is located in a different drainage and viewshed than the majority of the proposed action; though access to the proposed action would pass through this prospect. Cumulative impacts associated with both mineral operations is limited to use of the same access road to the point where it intersects the Breed Creek prospect (Figure 2). This would be a minor addition to impacts from the proposed action.

In summary, the cumulative impacts of past activities and from other activities in the area do not substantially change the degree of impacts discussed under the preferred alternative.

MODIFIED ACTION ALTERNATIVE

This alternative would approve an exploration Plan of Operations without surface disturbance on the ridge where Devil's Chimney Cave is located and without the camp site being placed within the Tootsie Creek drainage basin.

This alternative could only be selected if exploration in this location was determined to cause unnecessary or undue degradation. However, the BLM-managed lands in this area would continue to be available for mineral exploration, unless withdrawn from mineral entry and existing claims invalidated. Manhattan, or another proponent, could submit a new proposal for agency consideration.

Air Quality

The impacts to air quality are generally proportional to the acreage disturbed for exploration purposes. This alternative reduces construction activities by about 10% from that in the proposed action alternative. Impacts would be similar to those of the proposed action, but reduced by a commensurate amount.

Not locating a base camp in the Tootsie Creek basin would cause exploration personnel to either camp at a different location outside the basin or work out of a motel in Chester or Shelby. This would cause an increase from two to three vehicles in daily traffic into the project area with a corresponding increase in particulate and exhaust emissions.

Minerals and Geology

The area targeted for exploration on the Devil's Chimney Cave ridge is where limestone has been altered by contact with intrusive igneous rock. This type of geologic environment is favorable terrain for mineral exploration. Past drilling on this ridge did encounter mineralization, but could not determine its ultimate thickness or extent. Removal of this particular target area from drilling would have a negative impact to mineral resource evaluation.

Geologic data that would have been gained, had the project proceeded, would not be acquired. Detailed assessment of mineral potential for part of the area would not take place. However, exploration would still continue over the majority of the project area. Overall, this alternative would have a minor positive impact to mineral resource evaluation.

Hydrology

Impacts to water resources would be the similar to those described in the proposed action alternative, though with a decrease in impact intensity due to the smaller amount of acreage disturbed and four fewer exploration holes drilled.

Removal of the camp from the Tootsie Creek basin would remove the any potential for impacts to water quality from camp wastes.

Soils

Impacts to soil resources would be the similar to those described in the proposed action alternative, though with a decrease in impact intensity due to the smaller amount of acreage disturbed.

Vegetation

Impacts to vegetation resources would be the similar to those described in the proposed action alternative, though with a decrease in impact intensity due to the smaller amount of acreage disturbed and exploration holes drilled.

Approximately 1,720 feet of the new road/trench construction would not take place. This was proposed in a forested area on the cave ridge. This would reduce the impact to forest vegetation from that in the proposed action.

Wildlife

Impacts to wildlife resources would be the similar to those described in the proposed action alternative, though with a decrease in impact intensity due to the smaller amount of acreage disturbed.

Land Use

Impacts to land use would be similar to that described in the proposed action alternative, though with a decrease in impact intensity due to the smaller amount of acreage disturbed.

Impacts to recreation use of the cave would be reduced considerably by this alternative because the road would not cross the hiking trail leading to the cave.

This alternative would also have an impact on use of adjacent private land and minerals. Restricting access to the private patented mining claims within the project area (Figure 3) decreases the owner's ability to lease them to potential mineral operators and lowers their value. The extent of this impact cannot be determined without extensive and sometimes subjective analysis. It has been charged by the mining claimants that this would be a significant impact.

Areas of Critical Environmental Concern

The exploration activity conducted to date, plus selection of this alternative would not eliminate the values for which the East Butte ACEC was designated.

The aspect of the ACEC designation associated with Native American traditional cultural values and practices would not be impacted to the same intensity as under the proposed action alternative (see Social section).

Noise and Visual Resources

Noise - Noise levels within the Tootsie Creek basin would be essentially the same as under the proposed action alternative, though with less construction the duration of disturbance would presumably be shorter. This would occur primarily during daylight hours. Individuals visiting Devil's Chimney Cave would probably still be able to hear the drilling equipment when work was in progress, but at a lower intensity than under the proposed action due to an increase in distance from the cave.

Scenic Values - This alternative would have similar impacts as the proposed action. The main difference would be an elimination of impacts to visual resources for visitors approaching the cave along the hiking trail from the east. However, once they reached the cave ridge overlooking Tootsie Creek basin the exploration roads and trenches would be clearly visible during operation and for several years after reclamation.

Cultural

Historic Properties - There would be an adverse impact under 36 CFR 800 regulations to the proposed National Register Historic District if subsequently determined eligible for listing. The undertaking would be within the district (see Chapter 3). The noise and traffic associated with exploration would be out of character with the historic district. Noise and traffic would be limited to periods of operation as there would be no field camp in Tootsie Creek basin. There would be additional visual intrusions to the setting in the Tootsie Creek basin area. However, there would be no impacts to any cultural remains associated with any proposed historic district, nor would there be any disturbance on the other two buttes. This adverse impact would not preclude eligibility to the National Register of Historic Places.

Other potential indirect impacts to Devil's Chimney could include improved vehicular access and the potential for vandalism. Security from vehicular access into the area would eliminate this potential impact.

There would be an adverse impact to a historic district as with the proposed action. However, the impact would be less intensive than the proposed action as there would be less disturbance.

Social

Individuals and groups would still be very concerned over exploration activities in the Sweet Grass Hills. Though this alternative would help reduce anxiety over impacts to Devil's Chimney Cave.

Traditional and Religious Use - The cultural, historical and spiritual associations of Devil's Chimney Cave make the risk of impacts to its physical or spiritual integrity particularly unacceptable to traditional Native Americans. The cultural associations of the cave, as relayed in oral traditions of the Chippewa-Cree, make it irreplaceable to group identity. As such, any action which would accelerate natural erosion of the cave would be a desecration. Although the limestone cave appears stable, it is possible that drilling and trenching on the ridge above the cave would accelerate its natural deterioration. This potential impact would be eliminated under this alternative.

The visual solitude necessary for vision questing has been previously impacted in the East Butte area by communication sites, exploration roads, canals, and the remains of historic mining activities. These impacts are most evident from high ridge tops or slopes without timber cover. The modified proposal would not disturb the traditional approach to the cave from the east. The new disturbance to the south and west would be visible from the top of the "cave ridge" and a short segment of the traditional trail after it drops into the Tootsie Creek basin. However, visitors to the cave from the traditional trail would not walk across exploration disturbance nor would the new disturbance to the south and west be visible from much of the timbered ridge on which the cave sits.

The viewsheds into the Tootsie Creek basin from the surrounding peaks would be affected by the new disturbance to the south and west of the cave. These intrusions may be visible for several years even after reclamation. However, there would be no new disturbance on the ridge where the cave is located.

Visual and auditory intrusion would occur during construction and reclamation activities. There would not be a camp in Tootsie Creek basin. Therefore, noise and traffic associated with exploration would be limited to operating hours. Since there would be no camp to maintain, the area would

be empty after hours and during periods of non-operation. The quality of spiritual use of the cave might be diminished during operating hours. Spiritual use of the area would not be affected during periods of non-operation. The number of traditionalists in Montana and Canada potentially affected by this alternative is unknown, but it would be fewer than the proposed action.

There would be impacts to traditional Native American use of the area. The short-term impact would be up to two seasons (three if reclamation is included) of reduced use. The quality of spiritual use would be diminished during operating hours due to noise and traffic. The long-term impact would be additional visual intrusions in the Tootsie Creek basin but not near the cave. The cave is central to the spiritual quality of the area. The impact would therefore not be as severe or intense as the proposed action. Overall, the impacts of this alternative to traditional Native American use of the area would not be significant.

Economics

Economic impacts from exploration activities would be similar to those described in the proposed action alternative, though with a slight decrease in expenditures due to the assumed shorter duration of the project.

If the individuals who would occupy the camp under the proposed action alternative instead chose to stay at a motel in either Shelby or Chester, there would be a slight economic benefit to that community.

Cumulative Impacts of the Modified Action Alternative

Selection of this alternative would increase the total cumulative disturbance level (past and proposed) to over 27,000 feet of road, or about 22 acres (Table 3).

The remaining cumulative impacts would be the same as those described under the proposed action alternative.

NO ACTION ALTERNATIVE

This alternative would deny Manhattan's proposed exploration plan. The activity described in the proposed action section would not take place.

This alternative could only be selected if the proposed plan would cause unnecessary or undue degradation. However, the area would continue to be available for mineral exploration unless withdrawn from mineral entry and existing claims were invalidated. Manhattan, or another proponent, could submit a new proposal for agency consideration.

Air Quality

There would be no impact to air quality if the exploration proposal is denied.

Minerals and Geology

Geologic data that would have been gained, had the project proceeded, would not be acquired. Detailed assessment of mineral potential in the area would not take place. This would be a moderate negative impact to mineral resource evaluation.

Hydrology

There would be no impacts to ground and surface water if the exploration proposal is denied. Reclamation of existing disturbances would still take place. This would remove a potential source of sediment load in Tootsie Creek.

Soils

There would be no impacts to soils if the exploration proposal is denied. There is an opportunity to improve upon previous reclamation (reshaping) of drill roads that would be lost under this alternative.

Vegetation

There would be no impacts to vegetation if the exploration proposal is denied. Revegetation would continue on existing disturbances to reestablish cover.

Wildlife

There would be no impacts to wildlife if the exploration proposal is denied. After revegetation of the existing disturbance the wildlife habitat would again be available for forage and shelter.

Land Use

There would be no impacts to other land uses in the area if the exploration proposal is denied.

There would be a significant negative impact to mineral use of the private lands within the project area that require access across BLM surface to conduct exploration.

Areas of Critical Environmental Concern

There would be no impacts to the ACEC values if the exploration proposal is denied. The management guidance for the ACEC would remain in effect.

Noise and Visual Resources

There would be no increase in noise levels if the exploration proposal is denied. The existing exploration roads would continue to be visible until blending into the surrounding landscape through revegetation.

Cultural

There would be no impacts to cultural resources if the exploration proposal is denied.

Social

Individuals and groups concerned about mineral exploration and development would feel their concerns were being addressed and that they had some control over what happened in the Sweet Grass Hills. There would be no additional impact to Native American traditional religious practices if the exploration proposal is denied. Impacts to traditional practices would continue to be a factor when considering future actions.

Economics

Annual exploration expenditures and employment during the summer field season would not occur, although there may still be some level of economic activity associated with casual use and reclamation. This would be a minor negative impact to economic conditions in relation to exploration expenditures occurring over the past 10 years.

Cumulative Impacts of the No Action Alternative

Selection of this alternative would leave the total cumulative disturbance level at slightly over 14,000 feet of road, or about 11 acres (Table 3) due to past exploration activity. Revegetation of this disturbance would continue.

There are no substantial activities in the project area that would add a measurable cumulative effect. The dominant activity occurring in the area was mineral exploration. The other uses such as hiking, hunting, grazing and communication site ROW activity have had relatively minor impact on area resources when compared to the past exploration activity. Minor contributing impacts to the project area could be associated with visual intrusion and servicing activities of the communication sites on Mount Royal. However, these sites are accessed by a road on the opposite side of Mount Royal and would not share traffic with the access road into the exploration area.

Another use occurring in the area is a small prospecting operation near the head of Breed Creek (T. 36 N., R. 4 E., Section 24: NE1/4). This prospecting operation has been worked intermittently for about 40 years. The current level of activity amounts to only several days per year for purposes of performing assessment work. This operation is adjacent the existing project access road but does not contribute to cumulative impacts under this alternative.

REASONABLY FORESEEABLE ACTIVITIES & IMPACTS

The chances of further activity put forth in this section are speculations based on a reasonable success rate. It is not meant to imply that this particular property is the only prospect that may ever be explored in the Sweet Grass Hills, or even on East Butte. There are many opportunities for exploration available and many different operators with different interpretations as to this, or any other, property's potential and who would approach exploration in a different manner.

Proposed Action (Preferred Alternative)

If sufficiently mineralized zones are encountered during the exploration project, it can be assumed the operator would want to conduct further exploration to define the limits and grade of the deposit. The likelihood of an additional exploration phase resulting from this proposal are less than 50%. If future exploration were to occur it would probably extend access roads to the east and southeast of the current drilling proposal. The amount and type of disturbance in a hypothetical next phase would probably be between 2,000 and 5,000 feet of access road construction with 10 to 20 drill sites; and occur in similar terrain immediately adjacent to the current activity. Impacts from such a scenario would be

similar to those described in the proposed action analyzed in this document, and generally would be proportional to the acreage disturbed.

Should future exploration be proposed additional environmental analysis would be required. Selection of any alternative analyzed in this document does not imply approval for future activity, nor does it restrict future activity to the level or location described in the previous paragraph.

If the proposed exploration project did not identify sufficient mineralization, it is unlikely there would be much additional interest in the area. This is due to the comprehensive nature of the exploration proposal in assessing the project area's mineral potential. Negative results of such a program would discourage future endeavors unless there was a substantial change in mineral economics.

Modified Action Alternative

Selection of this alternative would leave untested the mineral anomalies that were identified by previous exploration drilling on Devil's Chimney Cave ridge. It is foreseeable that the operator, or other operators, would then continue to submit proposals for exploration in this area. Since this is on the eastern edge of the project area future proposals may involve access from the east, with a large amount of road construction starting in Iron Creek and running contiguous with the existing hiking trail. This would be most likely to occur once reclamation of approved disturbance was completed and access from the northwest was not feasible.

Impacts from such a foreseeable future proposal may actually even exceed those that would have taken place under the proposed action alternative's foreseeable activity scenario. This is because there would be a larger amount of construction required to access the target area from the east and because such construction would coincide with an area of higher public use for recreation.

No Action Alternative

If the proposed exploration project were denied it is foreseeable that the operator, or other operators, would continue to submit proposals for exploration. This is based on the favorable surface geology conditions that would continue to attract interest in evaluation of the subsurface by the more intrusive exploration methods.

RESIDUAL IMPACTS

The following is a comparison of impacts that would remain after application of all mitigating measures, operating practices, and consideration of the reclamation plan.

TABLE 4
RESIDUAL IMPACTS

	Alternatives		
Resource	**No Action**	**Preferred**	**Modified**
AIR QUALITY	None	Minor negative impacts due to particulates from drilling and construction.	Similar to Preferred Alt.
MINERALS & GEOLOGY	Moderate negative impacts, loss of geologic data.	Moderate positive impacts, acquisition of geologic data.	Reduced to minor positive impacts due to the target area near cave restricted.
HYDROLOGY	None	Negligible	Similar to Preferred Alt.
SOILS	None	Negligible	Similar to Preferred Alt.
VEGETATION	None	Minor, natural reforestation may take 5-10 years.	Similar to Preferred Alt.
WILDLIFE	None	Minor	Similar to Preferred Alt.
LAND USE	Negative impact to use of adjacent private mineral land.	Moderate impact to recreational use of the cave.	Minor impact to cave recreation. Negative impact to adjacent mineral land.
ACEC	None	Moderate to overall ACEC values.	Minor to overall ACEC values.
NOISE & VISUAL	None None	Minor to Moderate noise levels Moderate, visual evidence under direct observation for several years after reclamation.	Similar to Preferred Alt. Shorter duration of noise impacts. Less visual disruption near cave.
CULTURAL Nat'l Regtr Properties	None	Adverse impacts to cave area. Long term alteration to setting.	Similar to Preferred Alt. Less visual disruption to setting.
SOCIAL AIRFA Concerns	Minor, Native American concerns would be mostly satisfied upon reclamation of existing disturbance.	Significant. Area not suitable for Native American religious use either for an extended time period or indefinitely, depending on individual beliefs. Anxiety over disturbance by local residents.	Moderate. Suitability for religious use impaired, but at a reduced intensity by avoiding the construction on cave ridge. Anxiety over disturbance by local residents similar to Preferred Alt.
ECONOMIC	Slight decrease in expenditure for local trade and services.	Slight increase in expenditure for local trade and services.	Similar to Preferred Alt.
CUMULATIVE DISTURBANCE (Reclaimed and un-reclaimed)	Area disturbed to date is 11.3 acres.	Cumulative area of disturbance shown in table 3 is 23.2 acres.	Cumulative area of disturbance shown in table 3 is 21.8 acres.

CHAPTER 5
CONSULTATION AND COORDINATION

CONSULTATION

The following agencies or groups were consulted, or provided information to BLM/DSL:

Montana Department of Health and Environmental Sciences, Water Quality Bureau
Montana Department of Fish, Wildlife and Parks
The Assiniboine Treaty Committee
The Blackfeet Tribe
The Chippewa Cree Tribe
The Flathead Cultural Committee
The Gros Ventre Treaty Committee
The Kootenai Cultural Committee
The Northern Cheyenne Cultural Committee
The Original Chippewa Cree
The Sweet Grass Hills Protective Association
The State Historic Preservation Office
The U.S. Bureau of Indian Affairs
The U.S. Bureau of Mines

PUBLIC INVOLVEMENT

A public scoping meeting was held in Chester, Montana, on April 28, 1992, to identify resource concerns related to exploration activity on East Butte. Approximately 150 persons, mostly from the local area, were in attendance. Concerns voiced at the meeting focused primarily on potential impacts to water quality and Indian religious activity. Other concerns included reclamation procedures and visual and aesthetic values. Most individuals, while concerned with impacts from exploration, commented on the prospects of mining and its associated impacts on the above mentioned resources.

An EA was released on July 7, 1992, that described the impacts assessed to date and provided and opportunity for the public to submit any additional scoping comments by September 1, 1992. All known Native American groups were contacted by letter or phone and offered an opportunity to meet with agency personnel either onsite, or in an office setting, for the purpose of providing additional resource information and to assist BLM in the development of mitigating measures.

LIST OF PREPARERS

These individuals prepared this EA:

Richard Hopkins, Area Manager	BLM, Great Falls
Tad Day, Wildlife Biologist	BLM, Great Falls
Wendy Favinger, Economist	BLM, Billings
Joe Frazier, Hydrologist	BLM, Lewistown
Glenn Hadden, Realty Specialist	BLM, Great Falls
Scott Haight, Geologist, EIS Team Lead	BLM, Lewistown
Chris Jauert, Range Conservationist	BLM, Great Falls
Stanley Jaynes, Archaeologist	BLM, Lewistown
Jerry Majerus, NEPA Coordinator	BLM, Lewistown
Scott Spano, Soil Scientist	DSL, Helena
Joan Trent, Sociologist	BLM, Billings
Clark Whitehead, Recreation Planner	BLM, Lewistown
Kathy Ives, Printing Specialist	BLM, Billings

DISTRIBUTION

The following individuals and groups have been included on the mail list for the draft EIS:

ABERCROMBIE PIPELINE SERVICES INC
DURWOOD ANTLEY
BEAR PAW SENTINEL
J BURNS BROWN
GALE BUTTERFIELD
CLAUDE S DEMAREST
JOEL FROST CONSTRUCTION
HALLIBURTON SERVICES
HERMAN HANDSTEDE
JENSEN CONSTRUCTION
NORSE WELL SERVICE
POWERS ELEVATION
PRAIRIE WIRELINE SERVICE
SCHLUMBERGER WELL SERVICE
DARRELL T WHITE & ASSOCIATES
WILDCAT OILFIELD CONSTRUCTION INC
GARVEY WOOD
MEDICINE WHEEL ALLIANCE
J.F. DORMAAR
KENNETH R. & ELLEN SIEVERT
DEPT OF HEALTH & ENVIRONMENTAL SCIENCE

JERRY HENDRICKSON
NEIL S. SWARTZ
COEUR D'ALENE MINES
THE SHELBY PROMOTER
RICH DOYLE
ROBERT SISK JR
GROS VENTRE TREATY COMMITTEE
FT BELKNAP RESERVATION
ARCO OIL & GAS COMPANY, WESTERN DISTRICT
BRAUN INTERTEC
TOM BANGS
RUDY S CICON
FRISBEE, MOORE & OLSON
DARRELL GEIST
GLACIER-TWO MEDICINE ALLIANCE
SAGE CREEK COLONY
BONNIE R JOHNSON
KOOTENAI CULTURE COMMITTEE
HOLLY KROOK
GONI LAUCKNER
DELIA LYBECK
MARY E MATTSON
MINERALS EXPLORATION COALITION
CECILY R MCNEIL
MONTANA LAND & MINERAL OWNERS ASSN
MONTANA EPA OFFICE
E F & C F PRACH
RAPTOR RESEARCH FOUNDATION
REYNOLDS MOTT SHERWOOD & WRIGHT
GENE & LINDA SENTZ
WALTER A & HELEN STRATTON
3 U CATTLE COMPANY
RICHARD & MARTY THIELTGES
MARTHA J THIELTGES
LORI THOMPSON
ANN VANDESSEL
STEVE AABERG
ALBERTA ENVIRONMENT
WALTER STRATTON, ARROWHEAD RANCH
ASSINIBOINE TREATY COMMITTEE
NATIONAL AUDUBON SOCIETY, UPPER MISSOURI BREAKS CHAPTER
JOE AZURE
DAN BACHMAN
DR. DAVID ANDERSON, BACKCOUNTRY HORSEMAN
BADGER TWO MEDICINE ALLIANCE
MR & MRS KENNETH BANGS
GREG BECHLE
DELMAR BIGBY
BILLINGS GAZETTE
BLACKFEET COMMUNITY COLLEGE
BLACKFEET LEGAL DEPT, VICKY SANTANA
DAVID BLAIR
MIKE BRACKEN
ALMIRA BREVICK
DOROTHY BROWN
LEWIS F BURNHAM
HONORABLE CONRAD BURNS-US SENATOR
CLADY CARPENTER
CHIPPEWA CREE BUSINESS COMMITTEE
DOLORES CICON
GAIL CICON
MRS MARY LYNN CICON
JIM COFFMAN
ROB MCCOULLOUGH, MBMG
COMINCO AMERICAN RESOURCES
CONFERATED SALISH & KOOTENAI TRIBES
BURT CROCKETT
LOYD OLD COYOTE
DOUGLAS W DEMAREST
ELMER M DENGLER
JOEL DIEGLEMAN
DOROTHY OR JOHN W DUNCAN
SHEILA DUNCAN
GARY EAGLEMAN
PAUL ENGLISH
KEN & SHERRI DEAVER, ETHOSCIENCE
FLATHEAD CULTURE COMMITTEE
FT BELKNAP COUMMUNITY COUNCIL
FT PECK TRIBAL WATER
MERTEN FREYHOLTZ
EARL FRITZ AND JULIE FRITZ
ROBERT GOPHER
GREAT FALLS TRIBUNE
MARIE HELLINGER
LARRY & JANICE HENDRICKSON
HI-LINE SPORTSMAN'S CLUB
JOHN HILL SR
EDI & WAYNE HODGES
ISLAND MOUNTAIN PROTECTORS
JEFF JUEL
CALVIN KANNING
KEMC RADIO
KEN KNUDSON
KOJM-KPQX FM
KOOTENAI CULTURAL COMMITTEE, PAT LEFTHAND
KOOTENAI CULTURE COMMITTEE, FRANCI AULD
HOLLY KROCK
MARVIN STEPHANIE & CAROLE KROOK
BRIAN GAVIN
E K LEHMANN & ASSOCIATES
CHARLES LENIWEAVER
LIBERTY COUNTY COMMISSIONERS
LIBERTY COUNTY TIMES
DON & MARY LINCOLN
CLIFFORD & SHIRLEY LYBECK
MANHATTAN MINERALS, ANDREW CARSTENSEN
MANHATTAN MINERALS (US) LTD
HARRIETT & DONALD MARBLE

DAVE & KAREN R MATTSON
VIRGIL McCONNELL
LANCE & PAT MCDOWELL
MINERAL POLICY CENTER, WILL PATRIC
MONTANA ENVIRONMENTAL INFORMATION CENTER
MONTANA MINING ASSOCIATION
MONTANA PRESERVATION ALLIANCE
STATE HISTORIC PRESERVATION OFFICER, MT
STATE HISTORICAL SOCIETY
MONTANA WILDERNESS ASSN.
JOHN P MOORE
MONTANA DEPT OF FISH WILDLIFE & PARKS
MONTANA DEPT OF STATE LANDS
STATE WATER QUALITY BUREAU, TERRY WEBSTER OR TOM REID
WATER QUALITY BUREAU, CAROL MACKIN
ROBERT MURIE
NATIONAL TRUST FOR HISTORIC PRESERVATION
NATIONAL WILDLIFE FEDERATION, TOM FRANCE
MARK ENGSTROM
NORTH STAR MINING, PETE WOODS
NORTHERN CHEYENNE CULTURE COMM, BILL TALL BULL
PAUL FRIESEMA
MICHAEL & MARGARET NOVAK
ORIGINAL CHIPPEWA CREE, ART RAINING BIRD
ORIGINAL CHIPPEWA CREE, GENEVA TOPSKY STUMP
LLOYD OSWOOD
BRUCE PETERSON
LEO & MARY PETRIE
PROTECT GLACIER CANYON COALITION, SHARLON WILLOWS
GILLETTE RITTER
ROCKY BOY CULTURAL COMMITTEE, PATRICK CHIEF STICK
SHIRLEY RUDOLPH
SAGE CREEK COUNTY WATER DISTRICT
JOHN SCHMIDT
GENEVA SISK
ALAN SKARI
ARLO & DARLENE J SKARI
MORTON I SKARI
CULTURAL COMMITTEE, DOROTHY SMALL
GERALD SMITH
MONICA SMITH
SOCIOTECHNICAL RESEARCH APPLICATION INC
JOHN SOOSAY
JIM SPANGELO
GARY SPAULDING
WAYNE SPICHER
EDWARD SPINLER
SANDY SPON
MANAGER & RESIDENTS SWEETGRASS LODGE
RODNEY SWENSON
RICHARD THIELTGES
BECKY TIPLER
KEN TOMAYER
BUREAU OF INDIAN AFFAIRS, RICK STEFANIC
MSO-DIVISION OF MINERAL RESOURCES, BLM
BUTTE DISTRICT OFFICE, BLM
BLM DIRECTOR
US BUREAU OF MINES
US ENVIRONMENTAL PROTECTION AGENCY, REGION VII
FIELD SOLICITOR'S OFFICE, KARAN DUNNIGAN
STERLING & JANELL WARDELL
BYRON WEBER
WESTERN BREEZE, JAKE ELLISON
BONNIE & DON WESTFALL
NORTHERN ROCKIES OFFICE, THE WILDERNESS SOCIETY
HONORABLE PAT WILLIAMS
DAVID K W WILSON
ALVIN WINDY BOY
DANIEL & JANINE WOLERY
JOHN YELLOW KIDNEY
PAUL ZOGG
ZORTMAN MINING INC
SENTATOR MAX BAUCUS

REFERENCES

Bateman, A. F. Jr., 1969, Structure Contour Map Of The Laird Creek Area, Liberty County, Montana. U.S. Geological Survey.

Campbell, Newell P., 1978, Caves of Montana: Montana Bureau of Mines and Geology, Bull. 105, p.148.

Deaver, S., 1986 American Indian Religious Freedom Act: (AIRFA) Background Data. Prepared by Ethnoscience for Bureau of Land Management, Montana State Office, Billings, MT.

Department Of State Lands, State Of Montana, April 1, 1992, Updated Hard Rock Exploration Drill Hole Plugging Policy.

Dormaar, J.R., 1988, Waiting for a vision: The Explorers Journal 66(4): 144-149.

Gavin, Brian, 1991, Precious-Metals Mineralization in the Bearpaw Mountains and Sweet Grass Hills, North-Central Montana: Guidebook 1991 - Central Montana Alkalic Province. Montana Bureau of Mines and Geology, Special Publication 100. Pages 59-61.

Gavin, Brian, 1992, Personal Communication, Ernest K. Lehmann & Associates of Montana, Inc., Helena, Montana.

Lehmann, Ernest, May 4, 1992, unpublished letter, Ernest K. Lehmann & Associates of Montana, Inc., Minneapolis, Minnesota. BLM casefile MTM-78411, Lewistown District Office.

McConnell, V.F., 1990, August 9, Affidavit for State of Montana, County of Liberty.

Montana Department of Labor & Industry, Research & Analysis Bureau, various years, Statistics in Brief. Helena, Montana: MT Department of Labor & Industry.

Montana Geological Society, Montana Oil And Gas Fields Symposium, 1985, Billings, Montana. Vol 1 & 2.

Olson, Gary, 1991, Sweetgrass Hills Elk Monitoring Project: Montana Department of Fish, Wildlife and Parks. 47pp.

Osborne, Thomas J., and Zaluski, Marek H., 1985, Sage Creek alluvial aquifer test, October, 1984: Montana Bureau of Mines and Geology, Open File Report #157.

Ross, C.P., 1950, Fluorspar prospects of Montana: U.S. Geol. Survey, Bulletin 955-E.

Thompson, Larry S., 1978, Species abundance and habitat relations of an insular montane avifauna. The Condor - Journal of the Cooper Ornithological Society. Volume 80, Number 1, 14 pp.

U.S. Department of Commerce, Bureau of the Census, 1990, Census of Population 1990. Washington, DC: U.S. Government Printing Office.

U.S. Department of Commerce, Bureau of Economic Analysis, 1991, Regional Economic Information System. Washington, DC: Bureau of Economic Analysis.

_____, 1991, Regional Input-Output Modelling System (RIMS II). Washington, DC: Bureau of Economic Analysis.

U.S. Department of the Interior, Bureau of Land Management, 1989, Environmental Assessment for Cominco American Resources Tootsie Creek Exploration Project, Sweet Grass Hills, Liberty County, Montana: Plan of Operations MT-068-86-P02, Lewistown District, Casefile MTM-76046, volumes 1 through 7.

U.S. Department of the Interior, Bureau of Land Management, 1992, Record of Decision and Environmental Assessment, Royal East Joint Venture Exploration Project, Sweet Grass Hills, Liberty County, Montana: Lewistown District Office, Lewistown, MT; Case file MTM-78411.

Wardell, Sterling, Letter received May 4, 1992. Contains lab results of sampling done by Daniels and Associates, Inc. on August 16, 1988.

Western Technology & Engineering, Inc., 1989, Rare plant inventory and plant community descriptions of the Sweet Grass Hills proposed Area of Critical Environmental Concern, Toole and Liberty Counties, Montana: BLM, Great Falls Resource Area.

West HiLine Resource Management Plan/Environmental Impact Statement, Proposed Final, 1988, Bureau of Land Management. Record of Decision dated January 29, 1992.

INDEX

U S GOVERNMENT PRINTING OFFICE 1992—790-125 62,018 REGION NO 10